

VOL. XXXIV.

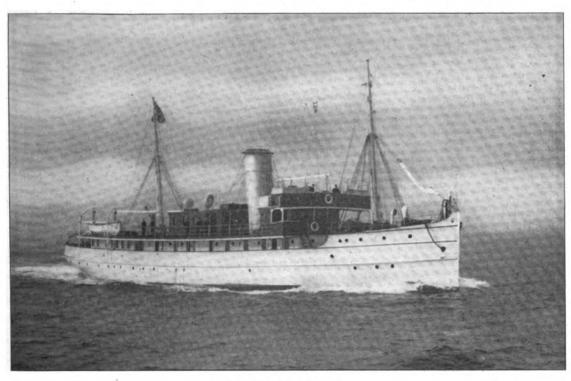
CLEVELAND, NOVEMBER 15, 1906.

No. 20

# ICE BREAKING STEAMER FOR THE ST. LAWRENCE.

An interesting craft is the new icebreaking and surveying steamer Lady Grey, which, launched on Aug. 27, last, is being completed by Messrs. Vickers Sons & Maxim, Ltd., of Barrow-in-Furlars, 172 ft.; breadth molded, 32 ft.; depth molded, 18 ft.; draught, normal, 12 ft.; draught, mean, when breaking ice, 13 ft.; displacement, 1,055 tons; speed, 14 knots. The hull, as indicated, is built of great strength to withstand the shocks due to impact against ice floes,

lateral pressure of the ice, which might otherwise close in and nip the hull. To further counteract athwartship pressure double framing has been fitted by the introduction of intermediate channels. Forward, where the vessel first strikes the ice, these additional members ex-



ICE CRUSHER LADY GREY.

ness. This vessel, built for the Canadian government, has been designed of special form and construction with heavy scantlings to break ice in the river St. Lawrence, and thus keep it open as far as possible in the winter season for navigation. The steamer is at the same time equipped for other duties when not engaged on her primary service. Thus, she is to be used by the marine and fisheries board for surveying the coast and channels in navigable waters.

The principal dimensions and particulars are: Length between perpendicu-

and to pounding of ice; and in view of surveying and other work the fittings and equipment conform in all respects to the requirements of the board of trade and the Canadian steamboat inspection act. The bow is of the "Canadian" type, formed for mounting and breaking through green ice, and for going through pack ice. To counteract pressure a broad belt of heavy planking is fitted right fore and aft, extending in depth considerably above and below the water line, and the gross sectional form of the boat is such as to resist the

tend from the keel to the main deck, while aft they are introduced between the bilge and the main deck. The side plating is also increased in thickness from the stern to a point well aft of amidships. The hull is divided into six water-tight compartments, and a double bottom extends from the forward to the after peak bulkheads. The compartments forward and aft of these bulkheads are arranged as deep ballast tanks, into or from which water can be pumped to quickly alter the trim to assist the vessel in riding over the ice, when, by

reason of the superimposed weight, the

ice is broken. A large pipe connects these

various tanks with the ballast pumps, for

quickly emptying one into another. In

addition to the usual steam windlas's

and cargo winch, steam capstans have

been fitted forward and aft for warping.

The boat is fitted with a large rudder,

and proportionately powerful hand and

steam steering gear. The portion of the rudder head at and above water level

is protected by a heavy casting, and the

gear is made strong enough to withstand excessive pressure when working

among ice. The propelling machinery consists of two sets of inverted, verti-

cal, direct-acting, triple-expansion, sur-

face-condensing engines, having three

cylinders working on cranks, placed at

angles of 120 degrees with each other, the sequence being high, low and inter-

gines when running at 130 revolutions

per minute are capable of developing

collectively 2,300 I. H. P. The diameter

of the H. P. cylinders is 19 in.; of the

intermediate cylinders, 30 in., and of the

low pressure cylinders, 49 in., with a

stroke of 27 in. Cast iron liners are

fitted in the H. P. cylinders only. The

steam distribution valves are of the pis-

ton type for the H. P. cylinders, of the

trick type for the intermediate cylinders

and of the double ported flat form for

the L. P. cylinders, and each is actuated

by valve gear of the double eccentric

link motion, with reversing gear of the

direct-acting steam and hydraulic descrip-

tion. The columns are iron castings of

box section. The condensers, the back col-

umn, centrifugal pumping engines for

supplying the circulating water, are fitted

for each condenser, but there is a cross

connection, so that either pump can cir-

culate through any or both condensers.

Two sets of propellers are being sup-

plied, a light set for ordinary summer

use, the other set is specially designed

for ice work. In each case the propell-

ers are of the built-up type, with three

blades. Steam is supplied at a working

pressure of 180 lbs. per square inch by

four single-ended cylindrical boilers, 12

ft. 9 in. diameter and 10 ft. 6 in. long.

The en-

mediate when going ahead.

YORK SHIP BUILDING NEW CO.'S OFFICERS. In a special number the Camden Generated on 2024-08-27 23:31 GMT Public Domain, Google-digitized Post-Telegram thus describes the officers of the New York Ship Building Co. De Courcey May, the president, was the first general manager of the company and succeeded to the presidency upon the death of Henry G. Morse. He is a Baltimorean, of varied experiences. He was sent to Paris to prepare for the Ecole Centrale, but did not enter the school, going, instead, to Scotland just before the outbreak of the Franco-Prussian war. He was in the class of engineering in the University of Edinburgh and apprentice in the workshop of T. M. Tenant & Co., Leith. From there he went to the engineering department of Cunliffe & Dunlap, Port Glasgow, on the Clyde, and subsequently became inspector in the Fairfield company's yard, Govan, Glasgow. After about seven years abroad he returned to this country in 1876, and took charge of the office of G. D. Levitt, consulting engineer for a firm in Cambridge, Mass. He was assistant and superintendent for the I. P. Morris Co., Philadelphia, for ten years, and engineer for the Cataract Construction Co., at Niagara Falls, at the installation of its plant. Immediately prior to his engagement with the ship building company he was general manager of the Dickson Manufacturing Co., Scranton, Pa.

Charles S. Hall, the vice president and general manager, was one of the earliest employes of the New York Ship Building Co., being its first purchasing agent. On the death of President Morse he was made general manager to fill the vacancy caused by Mr. May's elevation to the presidency. He is a graduate of Yale, as civil engineer; was an engineer of the Morse Bridge Co., and Edge Moor Bridge Co., and was thus associated with Mr. Morse for a long time. He erected the Liberal Arts building at the Columbian Exposition.

Samuel M. Knox, the secretary and treasurer of the company has been connected with various successful enterprises in Pennsylvania and Delaware. He became secretary of the company in 1902, and on the readjustment of the official force after the death of Mr. Morse in 1903, assumed the additional duties of treasurer.

Capt. William G. Randle, marine superintendent of the company, is well known in Camden and Philadelphia. For years he was connected with the American International Steamship Companies, from their inception in 1873, commanding and superintending the construction of nearly all their ships at the great yards of England, Scotland and this country. More recently he was in command of the Paris and St. Louis, serving on the latter as second in command during the Spanish-American war, during which time he held the rank of commander of the United States navy. He resigned from the command of the St. Louis in June, 1899, to become connected with the New York Ship Build-

The chief engineer Luther Lovekin, is from Cramps', where he was employed for ten years in the engineering department and later as chief of the drawing room.

## OIL ENGINES FOR MARINE PURPOSES.

In view of what is being done in connection with the propulsion of vessels by producer gas and petrol engines, it may be of some interest to note generally the uses to which the Diesel oilengine has been put, in this field. The producer-gas engine consumes about a pound of anthracite or coke for each effective horsepower, while the Diesel engine needs only 6.3 oz. of oil per effective horsepower. With regard to cost of fuel, therefore, the use of oil is cheaper unless the price reaches something like two and a half times that of anthracite or coke. It is claimed, moreover, that in addition to being able to do without cumbersome boilers or even gas producers, the use of oil engines, owing to their smaller consumption of oil, allows of a greatly increased range of action over either gas or steam-driven vessels for the same weight of fuel. This is estimated at 21/2 times the distance run by a vessel fitted with producer-gas engines, and from four to five times the range of a steamship. The main trouble in the application of oilengines to moderate sized vessels arises from the fact that the engines are nonreversible, and this being so, any arrangements devised to overcome this disadvantage are worthy of special attention at the present time.

One of the most interesting features of the marine section at the Milan Exhibition is the four-cylinder, two-cycle, 100 brake-horsepower reversible Sulzer-Diesel marine engine, built by Messrs. Sulzer Bros., of Winterthur. The engine weighs five tons, and its outside dimensions are: Length, 7 ft. 6 in.; width, 3 ft. 6 in.; and height, 5 ft. The inlet is governed by valves, and the exhaust is through ports cut in the cylinders. The explosive mixture supply is governed by a piston pump, which worked direct by the distribution is shaft; the stroke can be regulated at will, or reduced to o, while the engine is running. The pistons are plunger pistons, similar to those of ordinary explosion motors. The working is similar to that of the usual Diesel engine type, with the exception that an explosion takes place at every two strokes instead of at every four. After ignition and the corresponding explosion, the waste gases are scavenged through the exhaust ports. On the upward stroke of piston, the contents of the cylinder are compressed to so high a degree that the explosive mixture, introduced almost at the instant when the piston reaches the upper dead-point, ignites immediately on its entrance into the cylinder. This occurs at each revolution. For reversing the engine, the explosive mixture supply is stopped, the engine is brought

to a standstill, and is started in the opposite direction with the aid of a special restarting device. At Milan this takes three to four seconds. The distribution shaft is driven by worm-wheel gearing from the crank shaft, and works the valves by cams. Of the two pumps connected with the engine, one supplies the scavenging air, and the other that for the mixture. One is driven by a rocking-shaft, and the other direct from the crank shaft.

Another method of overcoming the difficulty of reversing is that of designing the propelling machinery as a combination oil-electric set. The Societe Nobel Freres, of St. Petersburg, put in service, in 1903, the vessel Vandale, in which this form of propulsion is employed. The vessel is an oil-tank ship of 1,100 tons displacement, and is used in the oil trade on the Volga and the Caspian Sea. The machinery consists of three sets of three-cylinder Diesel engines of 120 effective H. P. each, working 240 revolutions per minute. Each engine drives a direct-coupled 87kilowatt dynamo, working at 500 volts. This part of the plant is placed amidships, and the current is led by cables to three 75-kilowatt motors situated further aft, each motor driving a propeller shaft. The regulation of speed is performed for each group by working off the exciter current, furnished by a small exciting dynamo driven by the main dynamo-shaft. By this means rheostats are rendered unnecessary.

This system was found to be easy of control, and the vessel maneuvered satisfactorily; but in view of the losses by an arrangement of this kind which losses may amount to as much as 15 or 20 per cent an improved system was designed by Mr. C. Del Proporto, and has been installed in a boat working on the Lake of Geneva, and also by Messrs. Nobel Bros., of St. Petersburg, on the Sarmat, an oil-tank ship similar to the Vandale. In this system the oil-engine is placed further aft, and direct-coupled to a dynamo of about half the rated power of the oil-engine. A motor of power equivalent to that of the dynamo is placed at the end of the propeller-shaft. Between the dynamo and the motor is an electro-magnetic clutch, the oil-engine and dynamo-shaft being in alignment with the propellershaft. The dynamo and motor are also coupled up for electric working. The action is as follows: In starting or in maneuvering the clutch is cut out. Under these circumstances the oil engine drives the dynamo which generates power for the driving of the motor on the propeller-shaft. In continuous running the motor and propellers are allowed to attain approximately the same speed as that of the oil-engine and dynamo, and

as soon as this point is reached the two machines are coupled together by means of the electro-magnetic clutch, and the electric transmission is cut. By this means the losses due to electric machines are done away with and the armatures practically become fly-wheels. A small exciting dynamo is driven by the main engine shaft. In the Sarmat two propellers are provided, each worked by a set of four-cylindered 180 effective H. P. oil-engines. The direct-coupled dynamos are of 125 kilowatts capacity, working at 220 volts. The speed is 7.4 knots in the case of the Vandale, while the Sarmat attained a speed of 8.1 knots.

This second system certainly appears to have many advantages over the first, even apart from the reduction of weight and less liability to breakdown. Since the electric portion of the plant is only used for short intervals, it is possible to overload the dynamo for this space of time without much harm. The machines can therefore be much reduced in size as compared with those of the system used in the Vandale. The losses are much less in the second system, while if the electric part of the installation gets out of order, it is only necessary to couple the clutch by some mechanical means, and drive the screw direct. The power obtainable can be increased by arranging sets in tandem, when, if one breaks down, the screw can still be driven by the electric motor deriving power from either generator set. It is anticipated that little trouble will be found in the installation of some large powered sets, at least up to 7,000 effective H. P., while the system can be used for any sets developing over 30 or 40 effective H. P.—the limit for reversible propellers or gears. Three Diesel motors of 300 effective H. P. have been built for submarines in the French navy; and even with engines of this size, by means of suitable grouping, combined plants of considerable power may be obtained. The storage of oil on board ships is much easier, of course, than that of coal, and while coal must be handled, oil can be pumped from tanks placed anywhere in the vessel. Such advantages as these, together with the increase in useful range for the same weight of fuel are strong recommendations.

# DEMAND FOR BUILDING MA-TERIAL.

The latest advices received at San Francisco from Valparaiso is to the effect that there is a tremendous demand for all kinds of building material. Several cargoes of cement and structural iron are already on the way from Europe to Chili.

W. R. Grace & Co. have chartered several large tramp steamers to carry lumber from the Pacific coast to South America. The Norwegian steamer Reidar very recently sailed from San Francisco for Eureka to load part cargo of redwood, and will complete her cargo of lumber at Puget Sound. The steamship Clavenburn, under charter to the company, is now on Puget Sound loading for Chili, and the British steamer Druncairn is on the way to San Francisco from nitrate ports to get a cargo of lumber for Valparaiso.

#### MR. THOMAS C. FRAME.

Thomas C. Frame, who is now connected with the Pennsylvania lake front improvements at Ashtabula as assistant to Mr. J. P. Fitzgerald, engineer-in-charge, is one of numerous



THOMAS CLARKE FRAME.

young men at that port who have bright futures ahead of them. He graduated from Washington and Jefferson college in 1905 and took a post-graduate course at Case School of Applied Science. He worked for the government on the Ohio and at Ashtabula before going with Mr. Fitzgerald.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., is reported as having been the lowest bidder on the steamer to be built for the Old Dominion line. The steamer is to be practically a duplicate of their steamer Monroe, but will be designed to carry freight exclusively.

The steamer Foxhall was purchased by the Brunswick Steamship Co., Brunswick, Ga., last week. The Fore River Ship Building Co., Quincy, Mass., has four steamers under construction for the Brunswick company.

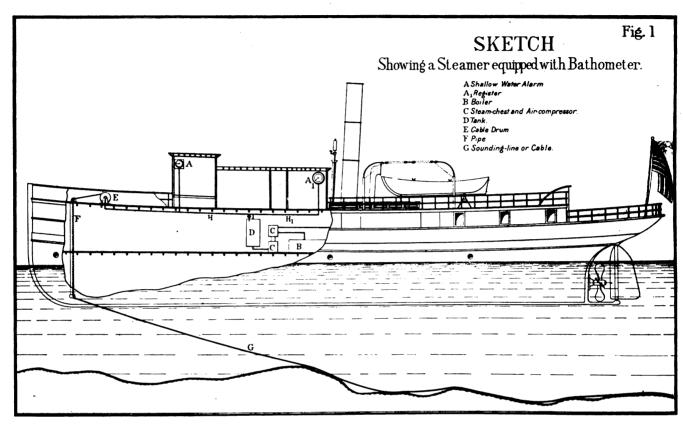


## BATHOMETER, ITS CONSTRUC-TION AND USE.

BY E. S. WHEELER, ASSISTANT GOVERNMENT ENGINEER.

This sounding apparatus is called a "bathometer" at the patent office. It is a sounding line, which shows at its upper end the depth to which its lower end is submerged in water. The prinan outside armor of wire, so that the line simply becomes a wire cable with a hollow core. Its extreme diameter is nine-tenths of an inch and its tensile strength is something more than three tons. It weighs one and a quarter pounds per linear foot. The air pump is shown at C, Fig. 1. Any form of air pump can be used, a bicycle pump

dial is covered with a movable paper card, the index or pointer carries a fountain pen which makes a continuous curve on the paper disk. When the disk has made one complete revolution it is removed and replaced with a new one. A paper disk is graduated with a scale of feet so that the curve marked by the fountain pen shows the depth



ciple involved in the construction of the bathometer is this: If air be forced through a tube, the lower end of which is submerged in water, the pressure of the air at the upper end will equal the pressure of the water at the lower end. If the pressure of the air at the upper end of the tube is known, the pressure of the water at the lower end (which equals it) becomes known, and since the depth of the water is a known function of the pressure, the depth of the lower end of the tube is known. The essential parts of the bathometer are: First, a hollow sounding line or tube weighted so that it will readily sink; second, an air pump capable of forcing a continuous stream of air through the sounding line and out at its submerged end; third, a pressure gauge that measures the pressure of the air as it passes through the sounding line.

The sounding line or tube is shown at G. Fig. 1. It is made of an inner tube of rubber having a bore of one quarter of an inch diameter. The walls of the tube are an eighth of an inch thick, making the external diameter one half inch. The rubber tube is covered first with two layers of cotton and then with will answer if no other is available. On the United States steamer Hancock a small Westinghouse air pump is used. When steam is not available a rotary hand pump is employed. In order to keep the air pressure uniform an air tank is used, which is shown at D, Fig. 1. The air is first pumped into the tank, which is provided with a governor which maintains a uniform in the tank. The volume of the tank is four or five cubic feet. The pressure gauge is shown at A, Fig. An ordinary pressure gauge with its dial graduated to show depth of water in feet instead of pounds could be and is sometimes used. In this case the depth of the water at the end of the line can be seen at any time, but no permanent record is left. For some of the uses of the bathometer it is desirable that a continuous record of the depth of the submerged end of the line be kept. For this purpose a special gauge or register has been designed. This register is shown at A<sub>1</sub> in Fig. 1. It is somewhat similar to the Crosby selfregistering gauge. It consists of an ordinary pressure gauge arranged so that its dial is revolved by clock work. The in feet of the submerged end of the line at every instant of time.

The parts are assembled for use as follows: On the United States steamer Hancock there is a 3-in. pipe located near the bow which passes from the upper deck down through the bottom of the boat, as shown at F, Fig. 1. The lower or submerged end of the line is passed down and out through the pipe. The upper end of the line is branched. One branch is connected with the air tank, as at H, Fig. 1. The air pressure in the tank is kept higher than the water pressure at the submerged end of the line. Air is admitted to the line from the tank through a small aperture less than one hundredth of an inch in diameter. When the lower end of the line is not submerged the air will pass through it without pressure except from friction, which is small and for the present need not be considered. When the line is submerged the water pressure at the submerged end will resist the air pressure and at first prevent its escape, but since the pressure in the tank is greater than the water pressure the air will continue to flow into the line until its pressure equals that of the wa-

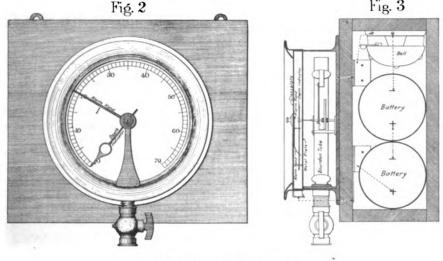


ter, it will then escape and the pressure in the line can rise no higher, the action being similar to that of a safety valve.

The second branch is attached to the register, as at H1, Fig. 1. Since this

wrecks, and for a "shallow water alarm." This last use may possibly be the most important and will be described in detail. The gauge made for this purpose is shown in Figs. 2 and 3. method of use may be illustrated by a

shorter line.) The depth of the end of the line will be indicated on the gauge. If the boat should check down to a less speed than 12 miles per hour the end of the line would sink and the gauge would show a greater depth.

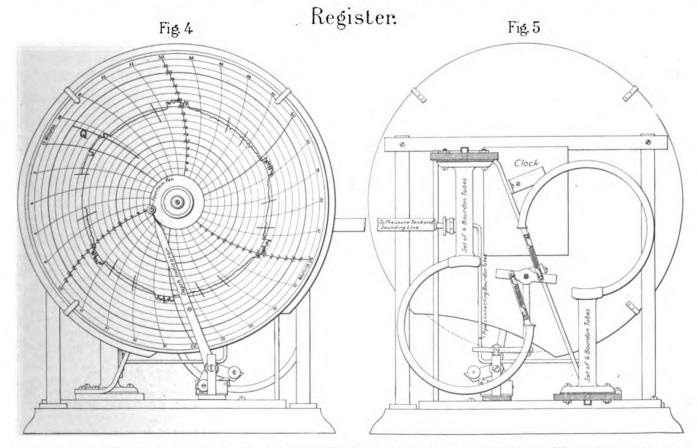


Shallow Water Alarm.

branch connects the line with the register the pressure in the register must always be the same as in the line. This a speed of 12 miles per hour. Suppose

special case. Suppose a vessel provided with a bathometer be running at

If the boat should stop then the line would hang vertically downward if the water was more than 200 ft. deep, if the water was less the end of the line would rest on the bottom and the gauge would show the depth. If the maximum speed of the boat is 12 miles per hour the submerged end of the line can never be less than 30 ft. deep so long as the boat is in deep water. If, however, the boat should get into a depth of less than 30 ft. the line would drag on the bottom and the end would be lifted up by the bottom so that the register would show less than 30 ft., if the master or pilot would keep a continuous watch of the register he would be warned of the shallow water. To avoid this labor of constant watching an alarm has been attached which gives warning whenever the line enters shallow water. This alarm is shown at Fig. 3. In the back part of the instrument box there is an electric bell



pressure expressed in feet is shown and recorded by the movement of the fountain pen on the paper disk. The uses to which the bathometer may be put are various; it has already been used for making hydrographic surveys, as a selfregistering tide gauge, for finding lost be obtained by using a longer or a

the bathometer line be passed overboard and paid out until the submerged end drags at a depth of 30 ft. (with the present form of cable and a speed of 12 miles this depth will require about 200 ft. of line, but any other depth can

and battery. When the movable hand shown at I, Fig. 2, is in contact with the depth indicator of the gauge the electric circuit is completed and the bell rings. Its use is as follows: Place, for example, the movable hand at 25 ft. on the graduated circle. When the



boat passes into 25 ft. of water the depth indicator, which has been at 30 ft., will drop down to 25 ft., come in contact with the movable hand, complete the electric circuit and cause the alarm to ring. This shallow water alarm will surely give warning when a boat passes from deep into shallow water; it is durable, not more likely to get out of order than a compass or steam gauge; it is simple, requiring no special skill to operate. It is believed that it will be a very useful aid to navigation, especially in inland waters.

The bathometer may be used as a log. When the shallow water device is used on shipboard the register and alarm may be combined in one instrument. The depth to which a given cable will sink when dragged through deep water is an inverse function of the speed of the boat. The speed corresponding to any depth of a given line may be determined experimentally and the scale of the record disk made to show in miles per hour instead of depth in feet; or by using two colors both scales could be shown on one disk. This log is only a minor function of the bathometer. It cannot be used in shallow water and it is not so perfect as the Nicholson, for exsome others ample. It is, however, a fairly good log, and a navigator having it would need no other.

Another important use of the bathometer is in hydrographic surveying. When used for this purpose the sounding line is dragged over the bottom at a uniform rate of speed. The submerged end of the cable rises and falls as it passes over the elevations and depressions of the bottom. The fountain pen moved by the varying water pressure records each rise and fall and an accurate and continuous profile of the bottom is obtained. This bathometer has been used for this purpose on the United States steamer Hancock. A survey 22 miles in length was made last season for the purpose of making estimates of cost of proposed 25-ft. channel. The survey was cheaply and accurately made and the information obtained from the continuous profiles was in greater detail than is given by ordinary lines of isolated soundings. During this survey the Hancock was sunk by collision with the steamer Binghamton. A line across the channel was being sounded at the time. Fig. 4 shows the paper disk that was in the register at the time. The long straight mark at Q was caused by the shock of collision. Since the paper disk is revolved by clock work and makes exactly one revolution per hour, the time of collision is shown within a small fraction of a minute. Since the Hancock was running on a known line between buoys the place of collision was known within fifty feet. It is not probable that there was ever any other collision in the open lake of which the time and locality are so accurately known.

This disk is a fairly good illustration of the way in which the irregularities of the bottom are shown by the bathometer. It will be seen that the channel had been crossed five times during the hour which preceded the collision. The bottom of the channel is more irregular and two or three feet deeper than that of the adjoining lake. Note how clearly these features are brought out on the disk.

The bathometer may be useful in searching for lost wrecks. The bathometer on the United States steamer Hancock was used three years ago in relocating the wreck of the Winslow which lies in the north end of Lake Michigan. The cable was dragged about until it passed over the wreck, which was shown by a sharp depression in the curve on the record disk. The finding of this wreck was no very difficult matter, because its location was known within a thousand feet. The incident. however, shows the facility with which the bathometer could be used in more difficult cases. It has been used for a self-registering tide gauge. It can be so easily and quickly installed that it is very convenient when only a few days' record is required.

This bathometer has been in use in the U.S. engineer office at Detroit for four years. During that time there have been many changes in its construction. It has been used principally in making hydrographic surveys and as a shallow water alarm. In its present form it works easily and accurately. The register and alarm are entirely satisfactory. The sounding line is not so durable as desired; a stronger and better form of cable is now being tested.

#### TURBINES FOR WARSHIPS.

As to propelling machinery, turbines will be adopted, says the Glasgow Herald, with slight modifications to improve the economy at low speeds. The results of the Dreadnought's trials established anew the economy of the turbine system for ships running at a full speed continuously. The difficulty in warships with turbines, as with reciprocating engines, is the variable rate of speed and the impossibility of arriving at a design and at proportions which will ensure favorable results at all rates of speed. This charge and occasionally carrying down could be achieved with more cruising charge quantities of ice, so as to subserve

bines when running at full power. But the limited space available for machinery in war ships makes a compromise imperative. Improvements will, however, be introduced. An important point is that the overloading of turbines increases the economy. In the case of the Atlantic liners it has been found that the increasing of speed has reduced the coal consumption per unit of power, and thus the Carmania is now doing almost as well as the Caronia, although the former is not yet being worked at her full Probably next season, when both ships are run at a higher speed --say, 19 knots, instead of 18 knotsthe economy of the turbine system in the Carmania will be demonstrated. The Dreadnought in action will be more economical than when cruising, although at the latter she is, like the Carmania, equal in economy to the best triple-expansion engined ship. The economy of the Dreadnought enables the weight of the boiler installation to be reduced, as at full speed she requires less steam than if reciprocating engines had been adopted. The boilers of the Dreadnought are 15 per cent lighter than they otherwise would have been, and thus the allowance of weight for all machinery is less. The speed of the new ships will, as in the case of the Dreadnought, be 21 knots.

#### **NAVIGATION CONGRESS.**

The International Congress of Navigation, to be held at St. Petersburg in June, 1908, has already arranged a provisional program, in the hope that engineers of all nations represented there will prepare papers to be read and discussed at that time. Concerning ocean navigation the congress seeks information regarding the best type of sea-going vessel for freight service and in relation to transshipment of cargo to craft on inland waterways and canals. The relative advantage of dry docks, floating docks, lifting appliances, etc., for the repair of ships, will be a subject of more definite nature. Other subjects under the general head of "Ocean Navigation" are the application and preservation of armored concrete in maritime works, harbors of refuge, the construction of ports on sandy shores, etc.

Concerning inland navigation three questions are addressed to all interested in such matters. These are: first, the arrangements to be given to weirs in rivers having great variations of disturbines, each proportioned for economy the interests of navigation and industry; at given speeds, because a system descend, study of the economical and signed to give 2,000 H. P. would give the echnical conditions of the working arsame economical results at that power angements and mechanical traction of as did the Dreadnought's 23,000-H. P. turboats on rivers, canals, and lakes, and



of the regulations necessary for this purpose; third, equipments of ports of inland navigation, especially the advance made in electric plants.

Papers will be read on behalf of the government and the various parties interested in the expenditure involved for the development of inland navigation.

#### LAKE NEWS.

Fire broke out in the forward part of the steamer D. C. Whitney at Racine, Wis. Considerable damage was done

Andrew Erlekson died at Milwaukee this week on the steamer Empire State of the Barry line. He was fifty years old.

The barge Quebec, owned by the Montreal Transportation Co. went ashore east of the piers at Charlotte this week.

The docks of the Lehigh Valley Coal Co. at Chicago were destroyed by fire last week, the estimated loss being \$750,000.

The steamer Shenandoah of Capt. J. C. Davidson's fleet is out of dry dock at Bay City with a new stem and new rudder.

The new steamer James S. Dunham left the Bay City yard of the American Ship Building Co. on her maiden trip Nov. 13.

The steering gear of the barge Martha became disabled in St. Clair river and she was towed to Cleveland by the steamer O. M. Poe,

The package freighter Lackawanna which went on the submerged breakwater crib of Cleveland harbor has been placed in dry dock No. 3.

The steamer building at the Ecorse yard of the Great Lakes Engineering Works for Mr. C. W. Elphicke, of Chicago, will probably be launched on Nov. 24.

The Coatsworth elevator at Buffalo has been purchased by the Spencer-Kellogg Co. The elevator is a wooden structure and has a capacity for 750,000 bushels.

The car ferry building at the Toronto yard of the Canadian Ship Building Co. for the Grand Trunk railway will be launched Dec. 1. This car ferry is 320 ft. long, 56 ft. beam and will draw loaded 15 ft.

A. A. Schantz, general superintendent of the Detroit & Cleveland and Detroit & Buffalo lines, says that about \$225,000 will be spent upon the steamers of the two fleets in repair work during the coming winter.

It is rumored that the Merchants Montreal line is negotiating for the purchase of the Anchor line steamer Japan, to be placed on the route between Toledo and Montreal in conjunction with the steamer Bickerdike.

The Tower Lumber Co. has sold to the Edward Hines Lumber Co. its entire cut of lumber of all kinds for next year, amounting to 45,000,000 ft. This is the largest deal in lumber made at the head of the lakes in a long time.

The steamer W. M. Egan was only 1½ bu. short on her wheat cargo of 84,000 bu. when unloaded recently at the Michigan Central elevator B at Detroit. This is a record. W. W. Ellsworth, superintendent of the Michigan Central elevator, unloaded her.

The Algoma Central Steamship Co. has awarded the Collingwood Ship Building Co. the contract to convert the large steel tow barge Agawa into a steamer. The Agawa was built at Collingwood in 1902, and is 379 ft. long, 346 ft. beam and 26 ft. deep.

Mr. Henry C. Barter, secretary and treasurer of the International Long-shoremen's Association, has sent out an announcement to the officers and members of the association that after four-teen years of continuous service he will leave the office on Dec. 13 next.

Capt. Harris W. Baker, of Detroit, has the contract for raising the steamer H. B. Tuttle, sunk off Sandusky, the blowing up of the steamer Mills, now lying in St. Clair river, and the removal of the barge City of Toledo, lying in the mud above Belle Isle bridge, Detroit.

The Reid Wrecking Co., of Sarnia, has secured the contract for releasing the steamer Lackawanna from the breakwater crib at Cleveland and delivering her in dry dock. Reid's bid was \$5,000 as against \$6,000 by Capt. Howard Baker and \$4,800 by the Great Lakes Towing Co. The towing company, however, only offered to deliver the boat in port.

Mariners claim that the lights installed at Port Colborne by the Canadian marine authorities are inadequate to safeguard vessels which use that port. Vessels are finding it difficult to pick out the entrance to the canal. The original beacon light which has been supplanted could be seen fourteen nules out on the lake.

F. C. McRae, of Greenleaf, Mich., and Wm. Plath, of Dryden, Mich., are breaking records for sobriety and industry on the steamer W. S. Mack. They have fired steadily for three seasons with Chief Engineer Blain. John Root, of Welland, Ont., would have done the same thing but for the fact that he quite earlier in the season, giving up sailing altogether. With M. A. Campbell, second engineer, they violate traditions by making up a "happy family."

Capt. Brown, manager of the Corrigan fleet, spent Thursday in Buffalo to look after docking the Italia for a broken wheel. He returned to Cleveland Thursday night.

William McCorkell, of Buffalo, was advanced to a mate's berth on the steamer Joshua Rhodes on her trip into Buffalo this week. He had been second mate on the boat for just a tew trips. Mr. McCorkell's father, Henry McCorkell, died while he was on the lake, and he was buried at Buffalo Sunday.

Col. C. E. I. B. Davis, government engineer with headquarters at Detroit, will in his annual report to congress recommend the construction of a new lock at St. Mary's canal. The dimensions of the proposed lock, to be located north of the Poe lock, are: Length, 1,350 ft.; width, 80 ft.; depth, 25 ft. over sills.

Supervising Inspector Westcott announces that after an investigation the steamboat inspectors at Chicago and Grand Haven, the complaint of unseaworthiness against the passenger steamer City of Kalamazoo, is not substantiated in any particular. The steamer, her machinery and equipment are in perfect seaworthy condition.

President Livingstone, of the Lake Carriers' Association, has protested to Col. Adams, government engineer at Buffalo, against permitting the city of Lockport to construct a pier in the Niagara river off the northern end of Tonawanda island. The pier would project 80 ft. out in the stream and vessel owners believe it would be a menace to navigation.

Orval Duncanson, who is wheeling on the steamer Fayette Brown, is the grandson of Capt. John Duncanson, one of the marine pioneers at Amherstburg and the foremost citizen of that town before his death a few years ago. He is the son of Joseph Duncanson, who sailed most of the season on the Brown, and a nephew of Capt. John Duncanson, master of the A. N. Marshall, and Capt. Don J. Duncanson, master of the Geo. L. Craig.

The four 600-footers now building for the Pittsburg Steamship Co., three at the yards of the American Ship Building Co., and one at the Ecorse yard of the Great Lakes Engineering Works, will be named George F. Baker, Henry Phipps, Thomas Lynch and Thomas F. Cole, all of whom are connected with the United States Steel Corporation. Messrs. Baker and Phipps are members of the finance committee; Mr. Lynch is president of the H. C. Frick Coal Co., and Mr. Cole is president of the Oliver Mining Co.





DEVOTED TO EVERYTHING AND EVERY INTEREST CONNECTED OR ASSOCIATED WITH MARINE MATTERS ON THE FACE OF THE EARTH.

Published every Thursday by

# The Penton Publishing Co.

BOSTON DULUTH CHICAGO NEW YORK
PHILADELPHIA
PITTSBURG

CINCINNATI

Correspondence on Marine Engineering, Ship Building and Shipping Subjects Solicited.

Subscription, \$3.00 per annum. To Foreign Countries. \$4.50. Subscribers can have addresses changed at will.

Change of advertising copy must reach this office on Thursday preceding date of publication.

The Cleveland News Co. will supply the trade with the MARINE REVIEW through the regular channels of the American News Co.

European Agents, The International News Company, Breams Building, Chancery Lane, London, E. C. England.

Entered at the Post Office at Cleveland, Ohio, as Second Class Matter.

November 15, 1906.

#### A RECORD BREAKER.

Representative of congress elect, Hon. Willis C. Hawley, of Salem, Oregon, has written to the Merchant Marine League of the United States, to say that the entire class in economics of Dallas College, of Dallas, Ore., has entered the contest for the four prizes of the Merchant Marine League for the four best essays on how to build up our shipping in the foreign trade. This is the best response that the league has yet received to its offer of \$1,000 in four prizes, and the officers of the organization are very much pleased. Details are not at hand of the number of students in the class in economics of the Dallas College, but it is alike creditable to the professor in charge of that subject (Prof. F. E. Fisher) and to the students of the class, that they are to make a concerted and united, although, of course, individual effort to secure

the prizes. The enterprise of these students is worthy of all commendation, and the MARINE REVIEW sincerely hopes that some of them may become winners. Moreover, the action of this class should stimulate other classes in economics at other colleges to do likewise, to thus swell the number of contestants, and to increase the study of this all-important public subject, to the end that the country may be better informed as to the condition and needs of our shipping in the foreign trade.

There are, approximately, five hundred colleges and universities in the United States, with a great many thousand students, and with large classes in economics, and why all these should not become contestants for the Merchant Marine League's prizes we cannot understand.

#### EVERYTHING FAVORABLE.

The recent election has an interest for our readers, because of the effect of the vote for representatives in congress. Had the election gone democratic, had the sixtieth congress been composed of a majority of men opposed to the president and his policies, possibly the republicans who now control the house of representatives by a majority of one hundred and twelve, and will at the coming session of the fifty-ninth congress, might have felt that a rebuke had been administered to them that would render unwise any attempt to pass the Mercant Marine Commission's shipping bill. Everyone knows that the majority held by the republicans in the present congress is abnormal, and that it was the result of the political tidal wave which swept President Roosevelt into office two years ago. But the republicans will have a majority of about sixty in the next house of representatives-a thoroughly substantial, good working majority, far less unwieldy than the present republican majority.

One of the peculiar effects of our political system is that, unless convened by the president in extraordinary session, the congress just elected does not meet in session until thirteen months after it is elected. We still have ahead of us the short and last session of the congress that was elected two years ago. So that the congressional election

that was just held has nothing but a moral effect upon the present congress. The effect of the majority elected last week will be to give republicans renewed confidence in the policies they have formulated, and embolden them to put them into effect.

The congressional election was especially a Roosevelt victory; it was a vote of confidence in the president by the people; it was a renewal of their indorsement of him, his policies and his personality. President Roosevelt strongly favors the passage of the merchant marine commission's shipping bill. During the five years that he has been president he has repeatedly shown his desire for legislation that will give us a strong and effective merchant marine in the foreign trade. In each of his anmual messages to congress he has urged upon that body the necessity for the passage of some measure of shipping rehabilitation. It was at his suggestion, made three years ago, that the merchant marine commission was appointed to study, investigate, and report upon the condition and needs of our foreign-going marine. The president has carefully read, and has warmly commended, the report of that commission; he has also read the bill that the commission prepared, and has, unofficially, but none the less emphatically, approved of it; he has done this on a number of occasions. No one now doubts where the president stands on the shipping bill; everyone knows that he desires its passage. The recent election has but strengthened his position with the people; it has given signal evidence of the confidence the people have in him and what he stands for. With all of these favorable conditions, with the people studying the subject as they never have been known to do before, with representatives hearfrom their constituents ing all the land in favor of pending bill, with the leading commercial and financial and industrial organizations formally indorsing the bill, with the press overwhelmingly in favor of its passage, what is to prevent the house of representatives early in the coming session from passing the shipping bill? We can see nothing. Everything is most favorable, and our belief in the early enactment of the pending bill is there-



fore only intensified. If it is not a law of the land before the holidays we shall be greatly disappointed; but we are as confident of its passage at the coming session as one can possibly be of an event still locked in the unknown of the future.

# THE PRESIDENT AT PANAMA.

When President Roosevelt reaches the Isthmus of Panama and contemplates the "big ditch" which the United States is digging across that comparatively small neck of land that divides the two greatest oceans, and thinks of the hundreds of millions of dollars of American money that will be expended upon alien soil for the promotion of the world's commerce, he will but be all the more determined to do all in his power to insure its being used by a large, growing and prosperous American merchant marine. canal is being built for the promotion of commerce; the convenience it will afford to our war ships is but an incidental advantage.

The years that will be consumed in the completion of this great highway of commerce, that will connect more closely than ever our Atlantic with our Pacific coast states, our great Mississippi valley with our equally great coast states, may also be wisely consumed in the upbuilding of a great, powerful and efficient merchant marine under the American flag.

Coincidentally, the recent trip made around the South American continent by Secretary of State Root has but more strongly than ever impressed the president's chief adviser with the necessity of better, more frequent, more prompt communication with the republics of the south. The first and most effective step that can be made in that direction is through the establishment of a large number of lines of swift American steamships, making frequent, regular and prompt voyages between the great republic of the north and its sisters of the south. This is a consummation, as was recently shown in our columns, most strongly desired by the statesmen of our sister republics.

Everything, therefore, points, all the more unerringly to the early and prolonged renewal of American shipping activity, with the accomplishment of that shipping revival that will not alone greatly increase and make far more stable our immense export trade, but that will afford that much needed, or, as Jefferson so tritely said, that essential instrumentality of national defense—an American merchant marine.

#### AROUND THE GREAT LAKES.

The steamer Pathfinder, which was ashore near White Rock, was put in dry dock at Cleveland.

The whaleback steamer Colgate threw off her wheel in Mud lake, and had to be towed to her destination.

The Canadian steamer Bickerdike is on the rocks three miles below Alexandria Bay, St. Lawrence river.

The Anchor line will discontinue receiving freight at Cleveland for all points at the close of business Nov. 21.

The steamer Iowa, of the Goodrich line, stranded at Hill's Point last week, in a fog. It was necessary to lighter her.

The steamer Philip Minch, laden with iron ore, ran aground off the entrance to the Buffalo & Susquehanna Iron Co.'s docks at Buffalo recently.

The steamer George Peavey was towed to Detroit last week for repairs to her steering apparatus. Her wheel was broken when she grounded.

Capt. William McCarter, of Buffalo, has been succeeded as master of the schooner Mingoe, of Buffalo, by Capt. Thomas B. Sharrow, of Detroit.

Under the ruling of the underwriters lumber steamers can have but one tow on Lake Superior after Nov. 1. This has caused several tows to go into ordinary.

Reports from the Welland canal ports say the canal is pretty well cleared of the congestion which had menaced navigation on the waterway for several days.

The Manitowoc Dry Dock Co., Manitowoc, Wis., has been awarded contract for the construction of a new fire tug for the city of Chicago.

General Superintendent A. A. Schantz, of the Detroit & Cleveland Co., says that the new passenger steamer, building at Wyandotte, will be launched New Year's day.

The steamer Resolute has reached Tonawanda with the first cargo of pulpwood ever taken to that port. It was consigned to the Tonawanda Board & Paper Co.

The improvements to the channel entrance at the Canadian canal, Sault Ste. Marie, have been completed. The channel now has a uniform depth of 21 ft. and is widened by 75 ft.

The plant of the Ship Owners' Dry Dock Co., Chicago, was formally turned over to the American Ship Building Co. last week. Mr. John Smith becomes general superintendent.

O. W. Blodgett, of Bay City, has made arangements to winter twelve vessels at North Tonawanda. Several of his boats are now laid up at that port. A number of them will be rebuilt or repaired.

The revenue cutter Fessenden, well-known on the great lakes, was severely damaged at Key West during the recent hurricane. She was thrown against the dock and one of her paddle wheels was crushed.

All gas and can buoys from Port Huron to the mouth of St. Mary's river are being removed by the lighthouse tender Marigold. Wooden spars will replace them to remain until carried away by ice.

The Superior Coal & Dock Co. unloaded the steamer John J. Albright at the new dock at Connor's Point in fifteen hours, working with three Mead rigs. During that time 6,900 tons of soft coal were unloaded.

Lake coal shipments from Buffalo for the month of October aggregated 357,-218 tons. August holds the record here so far this year with a total shipment of 471,627 tons. During September 365,-450 tons of coal were shipped.

The crew of the barge Cahoon were completely exhausted when picked up off Port Austin by the steamer Homer Warren. For three days they were practically without sleep in the desperate effort to keep the barge afloat.

Wm. E. Corey, president of the United States Steel Corporation and Harry Coulby, president and general manager of the Pittsburg Steamship Co., inspected the Steel Corporation property at the port of Conneaut last week.

Wireless telegraphy will form one of the courses to be taught at the nautical school conducted by Lieut. W. J. Wilson at room 1624, Masonic Temple, Chicago. It is understood that fifty-six pupils have already enrolled in the school.

The Milwaukee Trust Co. has been appointed receiver of the Chicago Transportation Co., commonly known as the Chicago & Milwaukee line. The trust company will act as receiver for the transportation company at Milwaukee only.

Capt. Harry Gunderson of the steamer Henry Steinbrenner, reports passing on Nov. 6, a dangerous derelict about 6 miles E. N. E. from Richmondville, Lake Huron, and about 18 miles on the course from Harbor beach to Detroit river. He says there was a large mast with broken part floating alongside, hull of derelict 8 or 10 ft. under water.



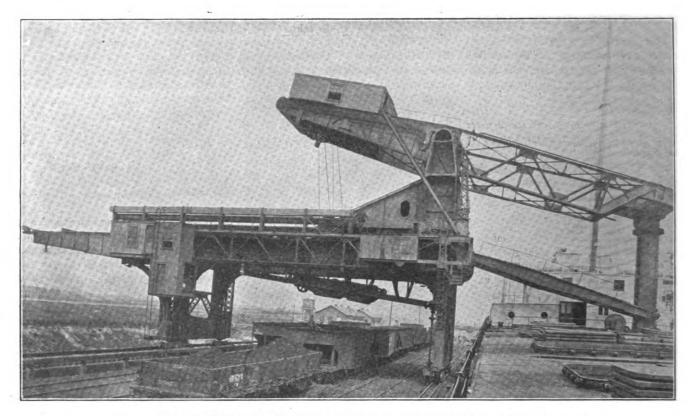


Fig. 1.—Hulett Ore Unloader at Buffalo. Bucket in Hold of Vessel.

# HULETT ORE UNLOADERS AT BUFFALO.

The accompanying illustrations show the latest installation of Hulett ore unloading machines. These are located on the docks of the Pennsylvania railroad in Buffalo, N. Y., and are electrically operated. As in the case of the other unloaders of this type previously installed, the machine handles a grab bucket with an average capacity for ten gross tons of iron ore. The spread of the bucket when open is over 18 feet, but by telescopic motion, it can be ex-

tended to a still greater distance, enabling it to cover a large amount of space in the hold of a steamer. It will reach more than half way from the center of one hatch to the center of the next one, when these are spaced 24 feet centers.

The bucket is carried on the end of a

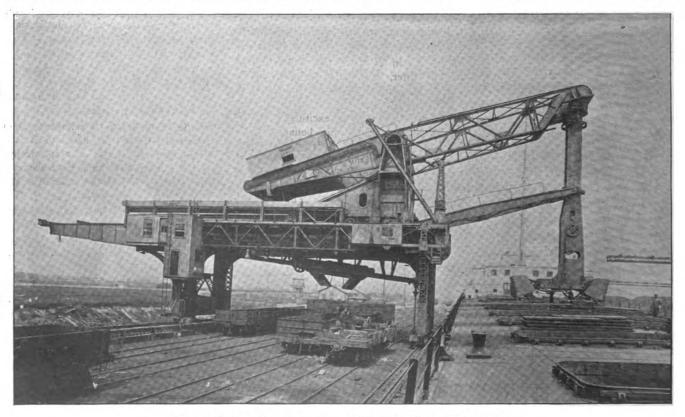


FIG. 2.—HULETT ORE UNLOADER AT BUFFALO. BUCKET ELEVATED.

vertical dependent leg suspended from a walking beam, which raises and lowers it, as desired. The bucket leg is mounted on trunnions at the top, so that the bucket may rotate while operating in the hold of the boat. By this means, it is allowed to reach out in any direction. The walking beam is mounted on a trolley or carriage, which carries it over the hold of the boat and back again over the dock.

Motive power for operating the unloader is furnished by motors receiving current through sliding contacts. bucket-opening-and-closing motor is 85 horsepower. That for hoisting the walking beam is 150 horsepower and for traveling in and out 50 horsepower; for operating the bucket and moving the machine, a 75-horsepower motor is used.

Ore may be unloaded into railroad cars on tracks underneath the unloader, or may be carried back on the cantilever of the unloader and delivered into a storage pit at the rear of the dock. In either case, it is delivered from the bucket into a special "bucket car," or traveling hopper, provided with folding chutes for discharging the material into cars or into the storage pit. This bucket car travels back and forth, as required, and on reaching the desired dumping point, is automatically discharged. The entire installation was made by the Wellman-Seaver-Morgan Co., Cleveland. which is the sole builder of the machine.

# LAKE RECOMMENDATIONS.

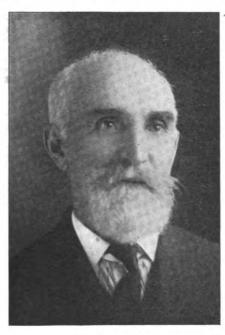
Gen. Alexander Mackenzie, chief of engineers, has reported to the Secretary of Warthat the following amounts can be profitably expended during the next fiscal year in river and harbor work on the great lakes: Harbor at Duluth, Minn., and Superior, Wis., \$140,000; Manistique harbor, Mich., \$100,000; Milwaukee harbor, including harbor of refuge, \$124,000; Chicago and Calumet harbors, survey of Illinois and Des Plaines rivers from waterway from Lockport, Ill., to St. Louis, Mo., \$250,000; Calumet river, Illinois and Indiana, \$250,000; Holland (Black Lake) harbor, Mich., \$105,400; Grand river, Mich., \$110,000; Muskegon harbor, Mich., \$110,000; harbor of refuge at Harbor Beach Lake Huron, \$430,000; St. Mary's river at the falls, Mich., \$500,000; Hay lake and Neebish channels, St. Mary's river, \$1,000,000; Detroit river, Mich., \$300,000; Sandusky harbor, \$175,000; Cleveland harbor, \$250,000; Fairport harbor, \$150,000; Buffalo harbor, \$102,336; Black Rock harbor and channel, \$222,000; Oswego harbor, \$125,000.

Mr. E. L. Corthell, the eminent civil engineer, has just left for London.

#### MR. J. G. LAIRD.

One of the pioneers at Ashtabula Harbor, and there are many of the sturdiest type, is J. G. Laird, who is still in the harness at the age of 67. came to that port in '78, a few years after ore was first received, and began the ship building business. His first ship yard was located where the Hanna car dump is, while the present one is just northwest of the bridge.

Mr. Laird started his career at the age of fifteen in the Aberdeen ship



MR. J. G. LAIRD.

yards. He served five years in the Portsmouth navy yard and afterwards sailed to China, India and around the world in the old clipper ships as ship carpenter, a trade he never gave up. Mr. Laird worked for the father of George Close at the Portsmouth navy yard. One of his exciting experiences was while on a ship bound for India during the mutiny. It was dismantled off Calcutta and afterwards scuttled by The Chinese took off Chinese pirates. so much, they lightered the ship and she got away.

Mr. Laird has two sons, who live in Ashtabula Harbor, Frank N. and John Laird.

# MALLORY FLEET.

The fleet of the Mallory line, which has been transferred by purchase to Charles W. Morse, consists of the following vessels:

Steamers San Jacinto, 6,000 tons; Denver, 5,000 tons; Concho, 4,000 tons; Sabine, 3,700 tons; Nueces, 3,700 tons; Comal, 3,200 tons; Lampasas, 3,200 tons; Alamo, 3,200 tons; San Marcos, 3,000 tons; Colorado, 3,000 tons; Rio Grande, 2,700 tons.

#### MISCELLANEOUS ITEMS.

The steamer City of Mackinac will leave on its last trip Nov. 19.

The Pacific Coast Steamship Co., Seattle, Wash., will probably lengthen the steamer Spokane 44 ft. this winter.

The new floating dry dock of the Merrill-Stevens Co., Jacksonville, Fla., is about ready to go into commission.

Charles Cramp Bowers has opened an office in; the Washington building, I Broadway, New York, as naval architect and engineer.

The New York Iron Works, No. 241 West street, occupy the shops which the late firm of McCurdy & Warden occupied for so many years.

The floating dry dock designed by Wm. T. Donnelly, of New York, for the John N. Robbins Co. will probably be built by the Maryland Steel Co.

The five-masted schooner Governor Ames has just been equipped with a new submarine signal system by the Submarine Signal Co., of Boston.

The steamer Saratoga, sunk in collision with the steamer Adirondack on Oct. 12, has been floated and taken to New York City for repairs.

The Dubuque Boat & Boiler Works, is building a transfer boat for the Vicksburg, Shreveport & Pacific Railroad Co. The boat will be 308 ft. long and 89 ft. over all.

The tug El Chico, 115 ft. long, and the 90-ft. tug El Toro, building for the Southern Pacific Co., were successfully launched at the yard of the Harlan & Hollingsworth Co. recently.

One of three steel barges recently constructed at the yard of the New York Ship Building Co., Camden, N. J., for the Consolidation Coal Co., of Baltimore, was launched last week

The three-masted schooner James Maxwell Jr., 165 ft. long, 36 ft. 1 in. beam, and 12 ft. 9 in. deep, designed for the coastwise lumber trade, launched at Millbridge recently.

The Harpswell Steamboat Co. has given contract to the Neafie & Levy Ship & Engine Building Co. for a steel steamboat for use in Casco bay. She will be 140 ft. long, 29 ft. beam and 11 ft. deep.

# REDUCTION IN RATES-LAKE SHORE RAILWAY.

Effective Nov. 1, the Lake Shore & Michigan Southern Ry. will reduce its rates on tickets sold to points in other states. No reduction in cash fares paid on trains to such points, however, will be made. You will save money by purchasing a ticket.



# LAKE SHIP YARD METHODS OF STEEL SHIP CONSTRUCTION.

BY ROBERT CURR.

SPAR DECK.

Fig. 87 shows part of the spar-deck and sheer strake riveting. The spar-

is no drilling whatever on the vessel. Fig. 89 shows the process of going on with the beams.

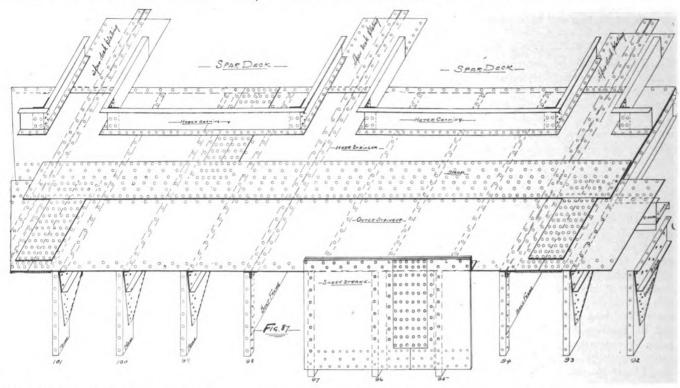
THE MARINE REVIEW

This vessel has a 12-in. tumble home at the spar-deck which decreases the width at that point to 54 ft. The camber of the deck beam is 12 in. and is obtained as shown by Fig. 89. AC is 12

is transferred to 1, 2 and 3 and a batten passed through same which gives the curve of the spar-deck beam.

The lines shown running from CD to the camber are simply to show where the corresponding points are transferred to

The height 3-3 from AD being angled



deck plating is simply a strip 3 ft. wide between the hatches for the whole length of the cargo space.

The greater part of the spar-deck is composed of stringers and made up of two plates, the inner strake next the hatches and the outer being connected in. and perpendicular to the line AB, which is the camber of the beam.

With AC as radius, the quadrant of a circle ACD, is described.

The curved line CD and base AD are divided up into four equal spaces and the points joined together as shown by is higher than the parallel line D<sub>3</sub> on 3 from the line AB.

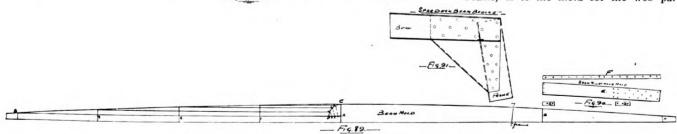
On the beam mold Fig. 89 the frames are scratched in as shown by number 7 which represents number 7 frame.

The lines A and B show the length of the spar-deck beam from the hatches to the ship side.

Fig. 87 shows the girders which are run in on the spar-deck, one just clear of the beam brackets, Fig. 93 and another in line of the hatch openings, Fig. 92. Fig. 90 shows the molds for these beams, E is the mold for the web part



- SPAR DEER PLATING MOLD-



to the sheer strake with angle bars.

The two strakes are connected together at the edges with strips 24 in. wide which is more of a doubling than a strap.

All the deck work as shown on Fig. 87, with the exception of the 24-in. edge plate, is laid out from the mold loft. All deck fittings are taken care of and the holes punched for same, so that there

dotted lines I-I, 2-2, and 3-3. The distance AB is the width of the beam at spar-deck and this distance is also divided up into the same number of spaces as the line AD. The perpendicular lines I, 2 and 3 on the line AB are erected for the purpose of transferring the heights, I-I, 2-2 and 3-3 from the line AD.

The distance along the dotted lines

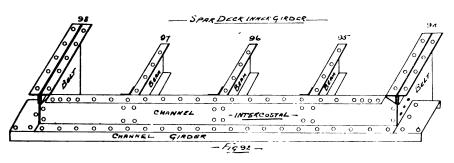
of the channel, C mold for channel girder rivet holes, Fig. 92. D channel girder rivet holes, Fig. 93. F shows the mold for the stringer rivet holes, Fig. 87.

Fig. 91 shows the arrangement of rivet holes connecting the beam and frame together with bracket plate. Fig. 44 shows mold used for the clips connecting beams and intercostals together.

Fig. 88 shows the mold for the spar-



deck plating. This is a half mold and is turned over the mold being applied to the center line and thus completing the deck plate from stringer to stringer. The holes marked B on Fig. 88 are for erally measuring boats and life rafts and looking after life lines and such things for prevention of loss of life, where if we had some kind of a law for compass adjusting we probably would not



the bracket rivets connecting the arch part of the web plate to the deck plating.

The part marked side is the rivet connection to the inner stringer plate. The intercostal part of the girder, Fig. 92, deck plate and stringer are all riveted together as seen by Fig. 87.

The beam framing of this vessel is composed of beam channel, beam bracket, longitudinal and intercostal girder channels and clips as shown by Figs. 87 to 93.

The belt frame was shown in the fourth article, Aug. 23 issue of Marine Review which shows the deck parts on same.

#### A SUGGESTION.

Editor MARINE REVIEW :- Something in these days of rigid steamhoat inspection seems to have been overlooked. This refers to the adjusting of the compass annually, which duty is generally being neglected. This is my second season on a steel steamer and in that time there has been no adjusting of compasses. We have two, one in the pilot house and another on the bridge, between which at times there is practically a difference of one to two and a half points: I remember one day our course was north, the pilot house compass had a variation of about 3-8 of a point, while the compass on the bridge read south. These compasses were last adjusted in the spring of 1904 according to the log book, and that is the last attention they have had, with the steamer in commission the whole two seasons of navigation. This same reason of the compass being in error is the first excuse of the officers of a ship for being ashore during a fog or snow storm, and it is generally the case. The cost of adjusting the compass is but like a drop of water in the ocean, and I can't understand how the vessel owners care to take such large risks of losing their boats, besides the loss of lives of the crew, which generally happens in case of shipwreck. The inspectors are genneed all these equipments, as there would not be so many wrecks.

Hoping these few words may result in some rules or regulations for adjusting the compasses when necessary, I remain.

A MARINER.

## THE STRAITS OF MAGELLAN.

For a comparison with the proposed Panama canal give the length of the Strait of Magellan, asks a correspondent of the New York Sun, its average width and depth, the rise and fall of the tide at either end, and the rate and direction of the current flowing through it. Do steamers navigate it by night, and why do sailing vessels round Cape Horn instead of using the Strait?

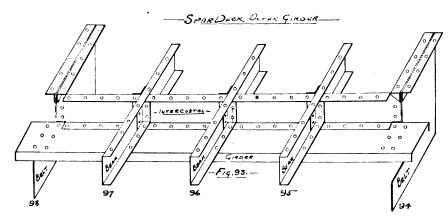
"The length of the Strait," says the Sun "from the Atlantic to the Pacific is 370 miles. The narrowest part, at Cape Quod in Crooked Reach, is only about one mile. Its Atlantic entrance is about 20 miles wide. At the First Nar-

making flood and go with the stream past both narrows. At the Pacific entrance the tide causes little trouble. The depth is uniformly so great that ships can approach close to shore. What few vigia there are in the fairway are buoyed as it were by the natural growth of kelp. The strait is lighted at intervals, and there is no difficulty in navigation by night. Sailing vessels continue to use the passage around Cape Horn because there are many spots in the straits where there is too little sea room for maneuvering, and because the high winds, locally known as williwaws, blowing suddenly down the mountain gorges, are a source of great peril. It is recorded that an American frigate was once eighty days in working through the strait.'

#### THE SUEZ CANAL.

From a return just issued, it appears that the number of vessels which passed through the Suez canal last year was 4,116, of which 2,484 were British, 600 German, 272 French, 219 Dutch, 70 Russian, 91 Italian and 139 Austrian. The transit receipts amounted to £4,554,672, a decrease over the previous year of £78,000.

The report of the board appointed by Secretary Bonaparte to consider and report on the designs and plans for a 20,000-ton battleship to be laid before the next congress must be ready by Nov. 20. This board consists of the assistant secretary of the navy, the chief engineer of the navy, the chief of the Bureau of Ordnance, the chief constructor of the navy, and Capt. J. P. Merrell, R. P.



rows the width is about two miles for a space of nine miles. Its extreme width is 70 miles. In Possession bay, just inside the Atlantic entrance, there is a tide of 40 ft.; inside the First Narrows the tide is 12 ft., and inside the Second Narrows 7 ft. This sets up a third current of some 6 miles an hour, to take advantage of which vessels leave Possession bay when the tide is

Rogers and Richard Wainwright. The private firms who submitted bids for this battleship are the Cramp & Sons Ship & Engine Building Co., Philadelphia; the Newport News Ship Building & Dry Dock Co., Newport News, Va.; the Fore River Ship Building Co., Quincy, Mass.; the New York Ship Building Co., Camden, N. J., and the Union Iron Works, San Francisco, Cal.



# Generated on 2024-08-27 23:31 GMT Public Domain, Google-digitized

# SCIENTIFIC LAKE NAVIGATION

# By Clarence E. Long

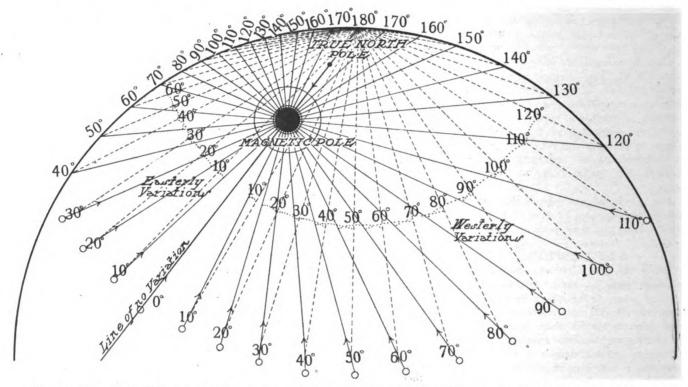
WHERE THERE IS NO VARIATION.

There are some parts of the earth where there is no variation at all, and here no allowance is to be made; the true and magnetic meridians coincide with each other, or the true and magnetic poles of the earth are as if in range one with the other. See diagram. An irregular line of no variation runs direction of the variation, or "magnetic variations or declination," as it is called by the chart makers. The tabulated form usually contains the date of observation, that is, the year it was found for, the name of the observer, the annual change, and other information of value. Another mode of showing the variation is by arrows representing the needle of

for any position. Whether these lines are in accordance with the actual amount of variation that really exists along each such line is a question.

THE TRUE AND MAGNETIC COMPASS ROSE.

Some charts are so drawn that the engraved compass roses (the diagram compass printed on the chart from which the angle or course is taken and placed



The above diagram should be substituted for the one published on page 33 of Marine Review, Aug. 16. It shows the relative positions of the True and Magnetic Poles, and the manner in which the compass needle points to the magnetic pole at all places on the earth's surface. Why the variation is named easterly and westerly at certain places, and also why there is no variation at certain places. The plain lines in the illustration are the magnetic meridians and indicate the direction of the compass needle under the influence of the earth's magnetism. On the earth's surface these magnetic meridians are very irregular curved lines; they are here made straight in order to give a clear idea of how the variation is formed by the angle included between the two directions, magnetic and true. The dotted lines from the center of the compass needle to the true pole represent the true meridians. Every one of these dotted lines represent true north. Variation is measured by the angle between the true and magnetic meridians. Variation of the Compass is the term used to denote the correction of the compass due to the angle between the earth's nearest true and magnetic poles, or between the magnetic and true meridians. It may also be defined as the difference between the true north and the direction indicated by the magnetic needle. By connecting all points which have equal declination, we obtain a system of lines which shows at a glance, the extent to which the needle deviates from the true north, in all parts of the world. The degree of variation is shown by figures attached to the lines. The lines of equal variation, at all points on any one of which the needle preserves one unvarying direction, must not be confounded with magnetic meridians which, passing through the poles of the meedle, would show what that direction actually is. The magnetic needle points to the magnetic pole and its direction indicates the direction of the pole at any place and also the direction of the magnetic meridian at the place of observation. The No

through eastern Europe, Asia and Australia; another runs through South America, near Rio Janeiro, and the southwestern part of the Atlantic ocean. The same line runs through the lake region, in the vicinity of the Straits of Mackinac.

WHERE THE VARIATION IS TO BE FOUND.

The variation is always to be found on a navigational chart by one method or another. On some charts a tabulated form is printed in which is given after the various localities the quantity and the compass by the amount of deflection from the true meridian. These are drawn through the various places of observation, and they have some such inscription as this printed above them: "Magnetic variation 6° 15' W 1900, increasing 4' annually."

The hydrographic office charts of the lakes on the Mercator projection show the variation by the system of isogonics, or equal lines of variation. By such method the variation is shown for all localities, and can be traced and found

thereon for the purpose of enabling the navigator to lay off his course) are already corrected for the magnetic variation. (Harbor charts are generally constructed in this manner, and now all the late lake survey charts have magnetic compass diagrams, as well as the true, printed on them, and they are of the double rose-the magnetic compass inside of the true compass). The inside rose represents the variation compass, and is slewed to the right or to the left by the same amount as the deflected needle

for the position printed; thus, the two together show the difference between the true and magnetic points of the observer's horizon. That is to say, the compass is drawn so that the north point does not indicate true north, but points in precisely the same direction as the north of your compass will when affected by the variation at that place. The true or geographical north is indicated, of course, by the fleur-de-lis, or star, as usual.

These compass diagrams are named on the chart "true compass" and "magnetic compass," depending upon which is which. The amount of variation and annual change is likewise usually printed on the magnetic compass-"variation 4° E, decreasing 4' annually." Sometimes on a general chart the magnetic compass will have printed on it some such inscription as this: "Variation at Duluth 8° E." This shows the variation needle at that place, although the position of the compass as printed on the chart may be far removed therefrom.

The advantages and disadvantages of these various modes of indicating the amount of variation will be explained another time.

The variation is named E and Weast and west-on the chart, whereas it should be Ely and Wly-easterly and westerly. Why, we have fully explained in a previous lesson.

## THE MAGNETIC COMPASS.

A compass rose printed so as to show the magnetic variation over a given surface of the earth will correct its own course when it is laid off with the parallel rulers and the reading of the course taken from this magnetic rose. The reason for this is that the chart is laid down according to the true line (lines running true north, south, east and west; called meridians of longitude and parallels of latitude) and a compass diagram so printed on the chart that it will make an angle with these true points must of necessity correct the true course for the amount of the variation shown by the deflected compass. That is to say, all places on the chart are drawn and laid down according to these true lines, and as these magnetic compass roses printed thereon are slewed to the right or to the left by the amount of the variation, name and direction, for the position given, any course taken from it must correct itself. Such a course will be a correct magnetic course, because it is the true course that has been corrected for the variation.

A magnetic course or bearing is the natural direction indicated by a compass when uninfluenced by other than the earth's magnetism, which gives it its directing power. Such an ideal condition would be found by placing the compass in a wooden ship without a particle of iron used in her construction, and away from any disturbing force, such as local attraction.

The true course is the angle made with the true meridian by a straight line on the chart drawn to connect the ship's position with the place bound to. When the variation is applied to the true course it is then named the "correct magnetic course" and not the "magnetic course" as it is wrongfully named.

If it were possible to construct a chart so that the meridians would be magnetic instead of true (over a large area), then the course laid down would be a magnetic course. It is possible to steer a magnetic course or take a magnetic bearing, provided there is no deviation (deviation is the deflection of the compass needle (card) from the magnetic north, caused by the boat itself being a magnet, and the magnetism of the iron used in her equipment, etc.) of the compass, but according to the true sense of the term "magnetic" course or bearing it would be impossible to lay the course or bearing on a chart and run it between two places. The course between the two places would be the true course, and to steer a course that would counteract the variation all along the course, or even at the beginning of the course, would necessitate the correcting of the true course for the variation existing. This course would then be the correct magnetic course and not the "magnetic" course.

#### VARIOUS DEFINITIONS OF COMPASS VARIATION.

The north point of the compass indicates true or geographical north at only a few places on the globe. At all other places it points a little to one side or the other of north. This deflection of the needle from zero is called variation of the compass. It is caused by the fact that the magnetic poles of the earth do not coincide with the true or geo-The former is about graphical poles. 1,200 miles south of the true pole, and the latter several hundred miles north of the true south pole. The needle is perfectly true; it points right at the magnetic north pole, but that pole is not the north end of the earth's axis. In navigating a vessel it is necessary to make allowance for the variation, and, its directions are indicated on charts. On large charts will be found irregular lines, or equal lines of variation (technically known as isogonic lines), running from the top to the bottom of the chart, and having beside them such inscriptions as 3° 15' Ely, 5° 45' Wly. This means that anywhere along this line the compass from true north and south is that number of degrees and minutes to the right or left of the true There are certain lines, as meridian. we have already learned, that have no

variation, and here no allowance is to be made.

"Variation of the compass" is the term used exclusively to denote the correction of the compass (not compass error) due to the earth's magnetism, arising from the fact that the magnetic north and south poles of the earth are not in transit (with the exception of a few places) with the true or geograpical poles. Variation may be regarded as the angle measured at the place of the observer between the earth's nearest true and magnetic poles. A compass needle, perfectly free from the effects of iron or other magnetic substance, in obedience to the earth's influence will rest in the plane of the magnetic meridian. It is also defined as the angle between the true north and south line of the compass card and the magnetic north and south line of the card. Variation, unlike deviation, affects every point of the compass the same amount when in any one position upon the earth's surface. In compass compensation (compass adjusting) the variation, of course, is never adjusted, as it is external to the vessel, and of different amount and name at different places. Variation is always the same at the same place with the exception of a small annual increase or decrease (from 2' to 5' on the lakes). Remember, that westerly variation is increasing and easterly variation is decreasing.

Variation.—The magnetic pole is some distance from the true pole of the earth, and since the north end of the needle is drawn toward the magnetic pole, the line of its direction varies from the direction of the true meridian. The angle that measures the difference in direction between the true meridian and a vertical plane passing through a compass needle out of reach of all magnetic influence except the earth's magnetism is called variation, and is named easterly and westerly according as the north end is drawn to the right or left of true north and south.

#### MAGNETIC DECLINATION.

Variation is also expressed "magnetic variation, or declination." Mariners use the term variation and geographers the term declination, that is, magnetic declination; both mean the same when applied to the compass. You have noticed that the variation is measured in degrees. That is one of the reasons why it is so important that the student should know the degrees and fractions of a degree corresponding to the various compass points, as well as the conversion of one into the other.

MUST MAKE ALLOWANCE ON EVERY COURSE. On every course sailed the navigator

must make the proper correction for the variation of the compass, or else the result of his calculations will be in error. If he has sailed due east for 24



hours, and has not allowed for the variation, he must correct that course for same, and he will find then that he has not sailed due east, but to one side or the other of it, depending upon the amount and direction of the variation. Conversely, when shaping a course the mariner must allow for the variation beforehand, that is, if he wishes to sail true SE 1/2 S, and there is a variation of a half point westerly, he must allow for that in shaping his course and sail SE by S. SE 1/2 S is the true course, and SE by S is the correct magnetic course-the true course corrected for variation.

## VARIATION IS A CORRECTION.

Variation is one of the corrections of the compass in converting a true course, or bearing, to a correct magnetic course or bearing, and vice versa, that is, a correct magnetic course or bearing converted to a true course or bearing.

THE TRUE COURSE AND BEARING.

The true course (or bearing) is the angle made with the meridian by a straight line on the chart, drawn to connect the ship's position with the place bound to, that is, the course laid on the chart and measured from a true north and south line.

THE CORRECT MAGNETIC COURSE AND BEARING.

Applying the amount of the variation to the true course, or bearing, always produces the correct magnetic course, or bearing, and similarly, applying the variation to the correct magnetic course. or bearing, produces the true course, or bearing.

TO CORRECT THE TRUE COURSE.

The first thing for the student learn in correcting courses is how to convert a true course, or bearing, to a C. M. C. (abbreviation for correct magnetic course) or bearing so for the time being and until you thoroughly understand the conversion of a true course to a C. M. C. throw from the mind entirely the conversion of C. M. C. to the true course, thereby adverting any chance of getting one mixed with the other. We know how it is.

THE RULE.

The rule for converting a true course to a C. M. C. is as follows. Allow easterly variation to the LEFT of the true course by the amount of variation to obtain the C. M. C. and allow westerly variation to the RIGHT of the true course by the amount of the variation to obtain the C. M. C. Remember, easterly variation to the left and westerly variation to the right of the true course always gives the C. M. C.

Thus we see that the correct magnetic course is derived from the true course by applying to it the variation at place of ship, which may be obtained either from the magnetic chart of the world, or from

any navigation chart. Easterly variation is applied to the left and westerly variation to the right of the true course. If the true course is north, and the variation is 20° easterly the C. M. C. would be N 20° W. In other words north would be where N 20° W is. Hence, since the true course has been corrected the corrected course is the correct magnetic course and not the magnetic course as many books and writers call it.

The true meridian is the line or direction from which the variation measured, or in other words, this meridian represents zero for variation. Then whatever the magnetic needle is turned aside, or out, of the true meridian, measured in degrees, is amount of the variation at any place. To get this thoroughly rooted in your mind imagine a compass needle that will always point (which, of course, it would not) to the true north pole, the same as the magnetic needle now points to the magnetic pole. Directly over the true needle imagine the regular magnetic needle in operation. Now, if you were to shift your position on the earth from place to place, the true needle would point continuously in the same direction without a change, and if you were to follow its direction you would describe a straight line, always in the same direction. This straight line is the true meridian. The regular magnetic needle during this journey would be shifting its direction constantly; sometimes it would be a greater number of degrees from the true needle than at other times. then a less number of degrees. Some of the time the magnetic needle would be to the right or east of the true needle, and some of the time to the left or west of the true needle, and at other times they might point the same, it all depending on which part of the world you were in.

Variation of the compass, then, is the difference between the true meridian and the magnetic meridian of any place. It is easterly when the needle is drawn to the right of north or south, and westerly when the needle is drawn to the left of north and south. It is indicated on the compass rose of the chart for the locality you are in, and contains the annual increase or decrease, as the case might be.

#### MAGNETIC CHART.

A magnetic chart of the world shows the direction (by a system of curved lines, called equal lines of variation, or isogonics) of the magnetic needle all over the earth's surface. These lines run very irregularly, just as the variation of the compass over the earth is very irregular. Starting from the north magnetic pole, a line is drawn through all places having the same amount of variation to the south magnetic pole.

These lines are usually drawn on the chart for each degree of variation.

The first time that one sees a magnetic chart of the world, or of the great lakes, he is apt to become alarmed at the number of and the irregularity of the lines representing the curves of equal variation. These lines on the chart look like a mass of tangled wires, but a careful examination of them and the inscriptions beside them, or at their top and bottom, will render the whole easily understood. You will at once see that each such line shows that the north point of the compass needle is deflected from the true north by the number of degrees that the inscription printed beside it calls for. Now, do not fall into the common error of thinking that each such line on the chart is the direction that the needle points in. The line merely marks all places having the same amount of variation. And, too, do not think that it is the direction of this line east or west of the true meridian at any place that accounts for the variation being either easterly or westerly, for it is not. Each line means that the variation is of an equal amount anywhere on that line, no matter where it goes and how winding and irregular it may be. No one line having the same amount of variation will cross another line having a different amount.

The magnetic variation differs from place to place, and also changes at the same place from time to time. In the lake region the variation is 10 degrees westerly at the east end of Lake Ontario, and at the west end of Lake Superior about 8 degrees easterly. Over the interlying region it ranges somewhat uniformly between these two extremes. As regards the change of variation with time, there has been a small and nearly uniform shifting over lake region in the last fifty years, the north end of the needle moving west; the change being nearly the same everywhere in the region and amounting to about three and a half degrees, causing the westerly variations to increase and the easterly to diminish by that amount. Variation of the compass is a matter that applies for all vessels alike, being external to the ship's hull and a part of the earth, and as we have explained in previous articles, the variation is the same for every point of the compass, no matter how the ship may be heading. This means any direction from the same position.

IRREGULARITIES OF MAGNETIC VARIATION CALLED NATURAL LOCAL ATTRACTION.

There are many minor irregularities in the distribution of the magnetic declination or variation, as shown by the devious courses of the lines of equal variation described on a magnetic chart. At the exact point where the variation



is observed, it is known with an accuracy of two or three minutes of arc. The method of observing, with a magnetometer, having a collimator magnet suspended by a silk fiber, gives a very accurate result. Another observation, however, at a point not very far away—a mile or so or even less—may give a variation differing by 30' or more. This is owing to local sources of disturbance.

The direction of the magnetic needle at some places differs very much from the normal direction for the region. This is probably due to masses of magnetic iron ore, or rock strata containing iron, in the vicinity but out of sight, underground. Large irregularities of this kind are to be found on the north shore of Lake Superior, of such importance that a special investigation thereof has been made by the Duluth U. S. engineer office. At Grand Marais, Minn., the variation changes within a short distance from 3° 45' Wly to 22° 13' Ely. Near Split Rock there is a change from 5° Wly to 17° Ely. At Stony Point there is a change of variation from 6° Ely to 27° Ely. At the south end of Cockburn island, in the north end of Lake Huron, near Magnetic Shoals. there is a considerable irregularity, the variation being 2° 11' Ely, while the normal for the vicinity is 4° Wly. Out on East Shoal, however, the variation is about normal, being 5° 46' Wly.

These irregularities are along shore and do not extend out very far over the water, the variation probably becoming normal three or four miles out. In deep water, any source of disturbance being below the bottom of lake, it is not likely, unless very extensive, to have much effect on a compass needle at the surface, as the effect of the disturbing masses diminishes greatly with the increase of distance from the needle.

The course from Duluth to Two Harbors is greatly affected by this local attraction, since this course is near shore. The effect is to draw the compass to the right and as the boat follows the compass, she, too, is carried to the right or off shore.

The course from Duluth to Devil's Island is but slightly affected by this north shore disturbance. In the vicinity of Duluth, but within the sound of the fog whistle, this disturbing force is felt. The U. S. steamer Vidette, which made the magnetic survey, made a test of the course from Devil's Island to Duluth, correcting the course from the variations determined. The run was made in thick weather by compass alone and disregarding the fog whistle when nearing Duluth. When within one-half mile of Duluth objects were sighted ahead showing that the vessel was heading 800 ft. north of the canal, equal to 1-6

of a degree of error on the entire course. This course was figured with a variation of 6.3° Ely for the first 30 miles from Devil's Island and 8.2° Ely for the remaining 38 miles, a mean true course of S 71.1° W. and the proper deviation for the steamer's heading. The convergence of the shores makes the approach to Duluth something like entering a funnel, and an error of not many degrees in this course would throw a vessel over to the north shore, and a near approach to the shore might bring it within the local attraction which occurs at Stony Point, for example. The average variation on the vessel course from Devil's Island to Duluth is not greatly different from that which would be taken from the lake survey chart. although the latter is based only on observations at Madeline Island and Du-

In the body of the lake there is some attraction within 10 or 12 miles of Duluth, amounting to from I degree to 5 degrees to the right or easterly of the easterly normal variation, covering areas of several miles extent in certain directions. These areas lie in the direct course for vessels making Duluth or Superior, but they are probably within the sound of Duluth and Superior fog whistles and not likely to trouble vessels. The safest way to navigate the course from Devil's Island to Duluth is to take the true course from Devil's Island to a point midway between Duluth and Superior. This true course is S 68° W. The variation at Devil's island is about 514° and about 714° at the middle of the course, giving a mean variation of 61/4°, and a mean correct magnetic course of S 6134° W for half the distance. The variation at the end of this course is 8° 36' Ely. The mean of this and 714° is 7° 55' equals 8°; giving a mean correct magnetic course for the second half the way of S 60° W. Since the normal as well as abnormal variations are all easterly, which means a pull of the compass card to the right, and as the ship follows the card, the effect would be to set the vessel a little to the right of the true course. This would be towards Duluthy In weather the Duluth fog whistle should be heard at least 8 miles away, so that the last 8 miles of the course will be guided by the fog whistle. By navigating the course just described both the Duluth and Superior fog whistles ought to be picked up about the same time. The safety of this course lies in the fact that there is no danger in case of fetching wrong, of approaching the shore north of Duluth, thus avoiding being brought within the influence of the abnormal disturbing force, which always pulls the ship inshore.

How the Magnetic Survey for Mag-

netic Variations and Local Attraction was Made at the Head of Lake Superior.-The method of time azimuths was employed, using a U. S. navy standard compass and azimuth circle on board the U. S. steamer Vidette, and a mean solar chronometer. The compass was uncompensated, but the vessel being a wooden one, the deviation was not large, and was carefully determined in Duluth harbor on several dates and applied to results. Maximum deviation 4 degrees. Observations were made for determining instrumental errors of compass, and for checking the method for reducing the sun azimuths.

Lines of observation were run across the lake perpendicular to its general direction, at intervals of 10 or 14 miles. The sun was observed at regular intervals of five minutes, which spaced the results a little less than one mile apart, the speed being between 10 and 11 miles per hour. The vessel was headed for a well defined landmark on the highlands of the north shore, so as to make a straight course unaffected by local attraction. The same methods were observed on the course from Devil's Island to Duluth. The variation from Duluth on this course for the first seven miles was found as follows: 8.2°, 8.1° for the end of the second mile, 6.9° at the end of the third, 8.1° at the end of the fourth, 7.5° at the end of the fifth, 6.4° at the end of the sixth, 8.3° at the end of the seventh mile. These seven amounts added and divided by 7 gives the average variation, 7.8° between these points.

# QUESTIONS FOR MASTERS AND MATES.—NO. 18.

265. When the annual change in the variation is large enough to materially affect the compass on the chart, what is to be done?

266. How would you allow for it if you did not have a new chart?

267. On what line does the compass and chart agree?

268. Describe the course of this line in the lake region?

269. Is an isogonic line a straight line or an irregular line?

270. Is the magnetic meridian of a place a straight line or a curved line?

271. What is the difference between an isogonic line and a magnetic meridian?

272. What kind of variation do we have to the east of the line of no variation on the lakes?

273. How do you know when the variation is either easterly or westerly?

274. Which variation is increasing and why?

275. Is the variation always to be found on the chart?



276. Is a magnetic chart compass of much service on the chart?

277. Do you use them?

278. Explain how you get the variation for your courses. Give an example of it.

279. What variations would you use to the true course between White-fish Pt. and Eagle Harbor? Would you make one course or two courses of it? Can you make one course of it? What will your correct magnetic course be between those two points?

# QUESTIONS FOR OILERS AND WATER TENDERS.—NO. 14.

141. Is not wet steam a source of danger?

142. What is the cause of wet steam?

143. What is the cause of foaming or priming?

144. How can you tell when the boiler is foaming badly?

145. What would you do in such an emergency?

146. Would you bring the engine to a complete stop should this occur? If not why so?

147. In case of low water would you suggest stopping the engine?

148. How would you proceed should you find low water in one of a battery of boilers?

149. What is a separator and where would you place one?

150. Does the average steam boiler furnish wet or dry steam?

# QUESTIONS FOR WHEELSMEN AND WATCHMEN.—NO. 19.

Give all principal shoals and landmarks passed on either hand.

In taking courses to make good the correct magnetic course you should take the mean of variation between ends of course.

191. How would you navigate a boat from Mud Lake turning at beacon to the intersection of Dark Hole and Pt. of Woods Rgs.

192. How would navigate a boat from the intersection of Dark Hole and Pt. of Woods Rgs. to intersection Harwood Pt. and Stribling Pt. Rgs.?

193. How would you navigate a boat from the intersection of Harwood Pt. and Stribling Pt. Rgs. to Nine Mile Pt.?

194. How would you navigate a boat from Nine Mile Pt. to the entrance of Little Rapids Cut?

105. How would you navigate a boat from Little Rapids Cut to the entrance Sault locks?

196. What signals do you blow if you wish to pass through American locks?

107. What signal do you blow if you wish to pass through Canadian lock?

198. From upper end Sault piers (Am-

erican) how would you navigate a boat to abreast of Foote's dock?

199. From Canadian lock how would you navigate a boat to abreast of Foote's dock.

200. From Foote's dock how would you navigate a boat to the intersection of lower and upper St. Mary's River Rgs.?

#### FREIGHT SITUATION.

There have been no conferences as yet for lake freights for next season, but doubtless the rate will be fixed quite early, possibly before the end of the year. Ore shippers have sold all the ore they care to promise to deliver during 1907. The advance sales of independent interests being fullyequal to last year's advance sale at prices that work out at an advance of 90 cents for Bessemer and 60 cents for non-Bessemer. In a single week the total 1907 output of the mines was sold. Whether vessel owners will share in the obviously advanced profits of the shipper remains to be seen. If the situation is to be governed by the law of supply and demand there will probably be no advance, as present tonnage could easily care for a reasonable increase in 1907 ore the movement over that of 1906. Considerations of supply and demand have not, however, always been the determinating factor in the lake trade. If all ships on the lakes were of 10,000 tons capacity, 75 cents would be a respectable freight rate. There is a fine margin of profit in the business at that rate for the 10,000-ton freighter, but the bulk of the ore movement is nevertheless cared for by ships of far less capacity than that, whose margin of profit at that rate is slight. Indeed the average of the Steel Corporation's fleet is only a trifle over 5,000 tons. Vessel owners are not discussing the subject, but they are of opinion, however, that they should have their due share of the prosperity that is marking the iron business.

Another month will see the lake business of 1906 ended Already the Steel Corporation is retiring its barges. The ore movement is steady and will continue so until the close of navigation, but the coal trade is marked with much vicissitude owing to the impossibility of getting that commodity to the lakes. Railroads are short on cars and shippers are way behind on contracts. Coal stock piles in the northwest are likely to be low when Grain has fallen altospring opens. gether flat.

Foul weather has marked the trade during the past week, and dozens of freighters have been held out in the lake, tugs being unwilling to take the responsibility of taking them in.

Below are the grain shipments from the head of the lakes:

	Receipts.		Shipments.	
	Nov. 10	. Nov. 3.	Nov. 10.	Nov. 3.
Wheat .	2,232,220	1,925,566	2,271,320	1,409,494
Corn	. 3,769	670	21,459	
Oats	114,927	186,196	129,230	103,113
Barley .	554,254	545,559	408,043	7,355
Rye	37,974	27,013	1,034	
Flax	1,264,054	1,322,060	804,711	684,647

#### COAL SHIPMENTS.

Coal receipts at Superior docks up to Nov. I are more than 100,000 tons in excess of the total for the whole of the season of 1904, which was the biggest for the past five years. The receipts for the present season to the time stated have reached a total of 3,084,141 tons, as compared to 2,895,460 for the whole of 1904. The current receipts exceed the receipts at Milwaukee for the same period by nearly 1,000,000 tons, all of the excess being soft coal, the hard coal having made an inferior showing.

The comparative receipts of the ports of Milwaukee and Superior for the month of October is largely in Superior's favor as to both hard and soft coal. The local receipts for that month were 416,314 tons of soft coal and 146,571 tons of hard coal. In Milwaukee the receipts were 194,568 tons of soft coal and 80,039 tons of hard coal. The coal receipts of the two ports since and including 1902 are:

	Superior.	. Mil-
	_	waukee.
	1902.	1902.
Anthracite coal	159.429	168,219
Bituminous coal		1,189,297
Total	1,815,880	1,357.516
	1903.	1903.
Anthracite coal	502,133	959,186
Bituminous coal	1,981,377	1,657,048
Total	2,573,510	2,616,234
		1904.
Anthracite coal		
Bituminous coal		
Total	2,895,460	2,712,334
	1905.	1905.
Anthracite coal		
Bituminous coal	1,634.540	2,018,908
Total	2,216,432	2,819.841
		1906.
Anthracite coal	-	612,591
Bituminous coal		1,623,124
mannous cour		
Total, November	3,084,141	2,235.715

The schooner Oak Leaf struck a submerged pile at Kotcher's lumber pier, Detroit, last week and would have sunk but for the prompt arrival of the fire tug. She was lightered of her cargo of gravel sufficiently to bring her injury above the water line.



## MR. D. A. TOMPKINS.

graph is published herewith, is vice president the Merof

chant Marine League of the United States for the state of North Carolina. Mr. Tompkins is president of the D. A. Tompkins Co. of Charlotte, N. C. He is the chairman of the merchant marine committee of the National Association of Manufacturers and has given the subject of shipping in the foreign trade considerable attention. It was as chairman of this committee that he presented the masterful report on merchant marine as published in the MARINE REVIEW of Oct.

# THE JAMESTOWN EXPOSITION.

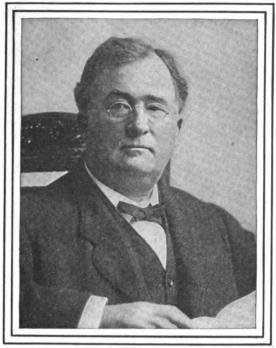
Of all exhibitions held in the United States since the Philadelphia Centennial in 1876, the Jamestown Ter-Centennial to be held on the shores and waters of Hampton Roads, near the cities of Norfolk, Portsmouth and

Newport News, Va., April 26 to November 30, 1907, is to be the most unique and in originality and novelty will completely eclipse all previous expositions.

The celebration commemorates the most important event in history-the founding of the first English-speaking settlement in America, at Jamestown, Va., in 1607, where Captain John Smith and a small party of colonists established a village from which has grown America, with nearly one hundred million population. The celebration will show the remarkable position attained by the United States in history and education, together with the marvelous industrial development and commercial expansion during three hundred years. Contemporaneous with the exposition will be held on the waters of Hampton Roads the greatest naval pageant ever witnessed in the world, in which every type of war vessel from the navies of all foreign nations will participate. Another attractive feature will be in the international military encampment in which detachments of troops of European countries will unite with the soldiers of the United States in a series of drills, maneuvers, parades, etc.

The site of the exposition is located within twenty minutes' ride of the tidewater cities of Virginia, reached either by trolley or steamer, and nature has combined with the ingenuity of man in making a beautiful and picturesque spot. The grounds cover more than 400 acres, with two miles of water front facing the

greatest waterway in the world, and Mr. D. A. Tompkins, whose photo- commands an unsurpassed view of innumerable points of national and historic interest.



MR. D. A. TOMPKINS.

## MARINE INSURANCE SEASON.

Mr. Sydney Crocker, marine manager of the Western Assurance Co., when asked to estimate the result of 1006 business said:

"I would not call this a normal season as far as underwriting results go. There have not been many total losses to date, but there have been too many minor ones to please us. Rates of marine premium are in the general opinion fair. But they are inequitable, for the system of valuation is wrong, and to my view, vitiates the basis of settlement. For example you insure for \$200,000 a steamer which costs \$300,000, and you pay premium on \$200,000. But when an accident occurs, and you have repairs to make, the underwriter is charged for these repairs on a very different scale from the valuation on which his premiums are based. It is common to estimate steel vessels in Great Britain as costing \$40 to \$45 per ton to build. On the great lakes the cost, as ascertained from different American and Canadian ship yards is from \$53 to \$60 per ton. So when your vessel injures her hull on a rocky bottom, or suffers from contract with another boat your underwriter has to pay for repairs a fourth more in proportion to what he receives. This is why I contend that the Old Country valuations work injustice to us here."

The National River and Harbors Congress will hold its third convention in Washington, Dec. 6 and 7.

#### OBITUARY.

Capt. George E. Tyson, who was assistant navigator of the Polaris, in which the Arctic expedition under Capt. Hall was made in 1871, died in Washington recently of heart trouble contracted from his last trip to the Arctic seas. He was born in Red Bank, N. J., in 1829, and during his early life worked in an iron foundry. Later, however, he shipped aboard a whaling vessel and became proficient in navigating among the ice floes of the Arctic. When Capt. Hall's polar expedition was fitted out in 1871 Capt. Tyson was made assistant navigator on account of his experience. During this expedition he, with 119 other members of the expedition, drifted for 196 days on an ice floe and many succumbed from hunger and cold. survivors were finally rescued by Capt. Bartlett, of the steamer Tigress, which had been sent in search of the Polaris. On his return to this country Capt. Tyson was appointed captain of the watch in the navy department, and served until 1877, when he was put in command of the Howgate preliminary Arctic expedition. There was a mutiny on this trip, and he received a stab wound, which is believed to have caused heart trouble. Upon his return in 1878, he was appointed lieutenant of the watch in the navy department, which position he held up to the time of his death.

Homer W. Candler, of the dredging firm of H. & J. Candler, died recently at Detroit from ptomaine poisoning following the eating of mushrooms.

# SUBMARINE SIGNALING.

Cable advices from Portsmouth, England, state that the carefully prepared official tests of submarine signaling by the British admiralty on Oct. 30 produced larger and more important results than any heretofore achieved. The submarine bell was suspended over the side of a gunboat, and the armored cruiser Antrim heard the signals at a distance of 16 knots with the engines stopped, and 14 knots with engines slowed. The Antrim obtained direction inside half a point. Moreover the gunboat and the cruiser exchanged messages under water at a distance of 5 knots, and the indications were that double the distance could have been obtained. These tests, taken in connection with the successful signaling between a tender and a submarine immersed 15 feet through a distance of 6 knots, also at the Portsmouth navy yard, have created genuine enthusiasm among the British naval officers, who have been giving the subject exhaustive study, with a view to the general adoption of the system in all the various forms to which submarine signaling is adapted.



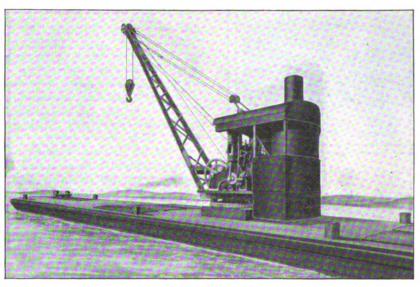
# REVOLVING CRANE FOR USE ON FLOATING SCOW.

A somewhat novel hoisting equipment is that shown in the accompanying cut of a floating scow equipped with a revolving crane or derrick. The crane itself was built by the Wellman-Seaver-Morgan Co., Cleveland, O., and was shipped to Japan to be erected on the scow, as shown, the drawings for the scow being also furnished by the Wellman-Seaver-Morgan Co. The crane is substantially a 10-ton locomotive crane, but without the car on which these cranes are ordinarily mounted. It is provided with a boom 36 ft. long, so arranged that it can be raised or lowered to vary the radius. The maximum lowering the boom to vary the radius. The operator's platform is between the boiler and the engines, so that he is in full view of the work. The length of the scow is 100 ft. The operation of the crane is entirely by means of steam, the usual drums being provided for the hoisting ropes.

## ITEMS OF GENERAL INTEREST.

The first of four 90-ft. gunboats building at Nixon's ship yard, Perth Amboy, N. J., for Hayti, was launched last week.

Ship carpenters in New York city are still on strike, making six weeks that they have been out. There is no sign of weakening on either side.



REVOLVING CRANE ON SCOW.

radius at which the boom is designed to be used is 30 ft., measuring from the rotating center of the crane to the center of the hoisting block hook, and the minimum radius is 12 ft. The maximum height of lift at 30 ft. radius is 21 ft., measuring from the bottom of the hoisting block hook.

The operating speeds of the crane are as follows: Hoisting with full load, 50 ft. per minute; hoisting without load, 125 ft. per minute; rotation of crane with full load, three revolutions per minute; rotation of crane without load, six revolutions per minute.

The lifting capacity of the crane at the different radii is somewhat dependent upon the stability of the scow, the maximum lifting capacity being ten tons. To increase the stability of the crane, and in view of the fact that the scow was a narrow one, a counterweight was placed below the boiler. The crane is provided with a vertical tubular boiler, and with a double vertical cylinder engine with reversing gear. The crane is also fitted with the necessary mechanism for rotating the crane, raising and lowering the load, and for raising and

The Harlan & Hollingsworth Corporation, Wilmington, Del., recently launched the tug which they are building for the Merritt & Chapman Wrecking Co.

Capt. Samuel Pike, senior commander of the Eastern Steamship Co., has been transferred from the Calvin Austin and is now in command of the steamer Governor Cobb.

The Kelley-Spear Co., Bath, Me., have been awarded contract by the Bay Shore Lumber Co., of Topsham, Me., for a barge 160 ft. long, 36 ft. wide and 12 ft. deep.

J. P. Murphy, Jacksonville, Fla., is to install a new engine in the little government steamer La Reve, which was used in exterminating water hyacinths in St. Johns river, Florida.

The navy department is considering the construction of a floating steel dry dock, 275 ft. long, at the Norfolk navy yard for the special purpose of accommodating torpedo boats and other small craft at the least expense.

It is stated that the Hamburg-American line has given contracts for the construction of two 750-ft. steamers, one to be built at the yard of the Vulcan Ship

Building Co., Stettin, Germany, and the other by Harland & Wolff, Belfast, Ireland.

George B. Billings and associates of San Francisco have given contract to Hall Bros. Marine Railway & Shipbuilding Co., Winslow, Wash., for the construction of a steam schooner capable of carrying 900,000 ft. of lumber.

Inspectors Gaul and Keller of Albany have reported to Capt. Ira Harris that the accident between the steamers Adirondack and Saratoga on Oct. 13 on the Hudson river, near Tivoli, was unavoidable. The accident occurred during a dense fog.

As soon as the hull of the revenue cutter which Rodermond Bros., Tompkins Cove, N. Y., are building is launched, it will be taken to the yard of the James Reilly Repair & Supply Co., Jersey City, to be completed, and then to the yard of the Pusey & Jones Co., Wilmington, Del., where her machinery is to be installed.

The new turbine steamer Governor Cobb, built by the W. & A. Fletcher Co., Hoboken, N. J., for the Eastern Steamship Co., made her maiden trip of 300 miles on an average of 18.4 knots per hour, and it is stated that during part of this trip she made 19.2 knots per hour. The steamer will soon be placed in commission.

The Spencer Miller marine cableway, owned by the Lidgerwood Manufacturing Co., is one of the systems which are to compete in a series of competitive trials in coaling warships at the Brooklyn navy yard which are now being prepared by the navy department. This system proved successful in coaling the battleship Massachusetts off Sandy Hook some time ago.

Naval officials are experiencing considerable uneasiness regarding the dry docks at the Brooklyn navy yard. It is feared that one of the big docks may have to be placed out of commission, as the land upon which the dock is located appears unsafe. Another dock is also reported to be in very bad shape. The navy department is much embarrassed over this condition of affairs on account of the lack of funds to meet the emergency.

The treasury department solicited bids for repairing the U. S. S. Bancroft which was recently turned over to the revenue cutter service in place of the old steamer Chase as a practice ship. The bids were as follows: The Newport News Ship Building & Dry Dock Co., Newport News, \$91,000; Shooter's Island Shipbuilding Yard, New York, \$95,000; Wm. Cramp & Sons Ship & Engine Building Co., Philadelphia, \$107,700; Pusey & Jones Co., Wilmington, Del., \$130,000.





VOL. XXXIV.

CLEVELAND, NOVEMBER 15, 1906.

No. 20.

# Great Lakes Dredge & Dock

Company

# RIVER AND HARBOR IMPROVEMENTS

Foundations, Bridges, Piers, Breakwaters,
Lighthouses, Tunnels, Pneumatic
and Submarine Work.

**CHICAGO** 

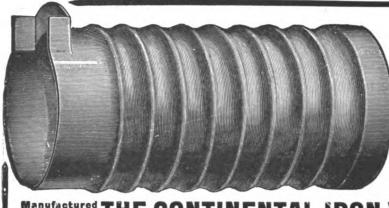
DULUTH CLEVELAND

**TOLEDO** 

SAULT STE. MARIE

https://hdl.handle.net/2027/nyp.33433109947659 http://www.hathitrust.org/access\_use#pd-google Generated on 2024-08-27 23:31 GMT Public Domain, Google-digitized

Digitized by Google



# Morison Suspension Boiler Furnaces

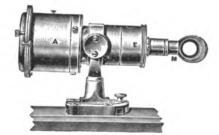
For Land and Marine Boilers

Uniform Thickness—Easily Cleaned UNEXCELLED FOR STRENGTH

Also Fox Corrugated Furnaces

Janufactured THE CONTINENTAL IRON WORKS,

Vest and Cayler Sts., NEW YORK Near 10th and 23d Sts. Ferries



# Walker's Patent "CHERUB" MARK II SHIP-LOG

(formerly called "CHERUBAL.")

Ship-log, with ball bearings. An improvement on our world famed "CHERUB." Suits all speeds. "Works like a watch" writes one Captain.

Makers to

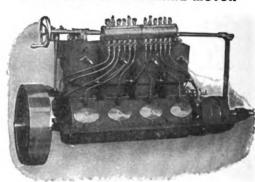
the British and Japanese Navies.

# THOS. WALKER & SON Ltd.

58 OXFORD ST., BIRMINGHAM, ENGLAND.

# TRUSCOTT

THE DEPENDABLE MARINE MOTOR



Made to withstand the most severe and continuous service. A practical design characterized by the accessibility, compactness and simple ignition, gas producing and oiling features. Perfect control.

Four cycle type two and four cylinders, from 8 to 65 H.P. Smaller sizes of the two cycle type.

Catalogue and copy of The Launch for the asking.

Department 46.

Truscott Boat Mfg. Co.

ST. JOSEPH, MICHIGAN.

SHIP MACHINERY, embodying the

latest designs and many important patented improvements.

Sole builders of the Original and Only AUTOMATIC

STEAM TOWING MACHINE.

Established: 1857

AMERICAN
SHIP WINDLASS CO.

Providence, R. I.

We have completed our new Iron Foun-

dry, and are prepared to execute orders for Castings, guaranteeing firstclass work, prompt service and reasonable prices.

> Send for illustrated catalogue

Address FRANK S. MANTON, President

P. O. Box 53

Digitized by Google

WM. H. EDGAR, Founder DEARBORN FEED-WATER TREATMENT

Made to suit the water as per analysis, used regularly, keeps boilers free from scale and prevents any corrosive action the boiler water may have on the iron. Economy of operation is possible only with clean boilers.

20 Branch Offices in the U.S.

226=234 Postal Telegraph Bldg., CHICAGO

299 Broadway, **NEW YORK** 

# Smith's Coal Dock

**DETROIT RIVER** DETROIT MICH.,

Platform. 12 Pockets. Low Dock.

Operated by

STANLEY B. SMITH & CO.

# THE ROBERTS

SAFETY WATER-TUBE

BOILER CO.

Manufacturers of

# Marine Water Tube **Boilers**

Generators of the Highest Quality of Steam

OVER 1500 IN USE

Send for circulars and stock sheet

MAINOFFICE

30 Cortlandt St.

New York City

Phone 599 Cortlandt

Works: Red Bank, N. J.

Phone, 49 Red Bank

Cable Address "Bruniva"

# PITTSBURG COAL COMPAN

GENERAL OFFICE, LAKE DEPARTMENT, ROCKEFELLER BUILDING, CLEVELAND, OHIO

Steamboat Fueling Facilities at Various Points on the Great Lakes

CLEVELAND HARBOR \ 3 Lighters.

FAIRPORT HARBOR { | Car Dumper. | Lighter.

ERIE HARBOR | Car Dumper.

ASHTABULA HARBOR ( | Car Dumper.

DETROIT RIVER BRANCH | Docks and Pockets at | Sandwich and Amherstburg.

SAULT RIVER BRANCHES Dock—Pittsburgh Landing. (The Port Royal Dock Co.)

PITTSBURG AND YOUGHIOGHENY COAL





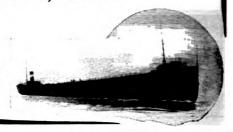
# The American Ship Building Company

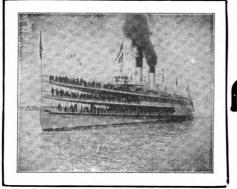
MAIN OFFICE CLEVELAND, OHIO

Marine and Stationary Engines STEEL SHIPS Auxiliary Machinery

Sole Agents for the Lakes for the Ellis & Eaves Induced Draft System, as applied to boilers, giving increased power and great economy.

WORKS AT CLEVELAND AND LORAIN





# Detroit Ship Building Company

SHIP AND ENGINE BUILDERS

Sole Owners for the Lakes and Atlantic Coast of the HOWDEN HOT DRAFT SYSTEM as applied to Boilers, giving increased power and great economy.

Steel Ship Yard located at Wyandotte, Michigan Wooden Ship Yards and Dry Docks, Foot of Orleans Street, and Footof Clark Ave., Detroit, Mich.

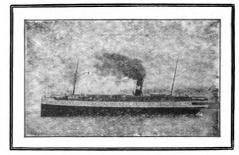
Wm. C. McMillan, President.
M. E. Farr, V. P. and Treas.
E. Ketcham, Secretary.
Frank Jeffrey, General Supt.

WM. L. BROWN, Pres.

J. C. WALLACE. Vice-Pres.

ALFRED G. SMITH, Gen'l Supt.

# Chicago Ship Building Company



# STEEL SHIPS

Passenger or Freight
ANY SIZE

Yards, Dry Docks and Repair Shops at South Chicago, Ill.



# The Superior Ship Building Company

SHIP AND ENGINE BUILDERS

Dry Docks and Repairs of all kinds

WEST SUPERIOR

WISCONSIN

Repairing promptly attended to, Night or Day.

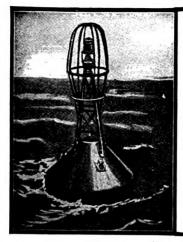


Large stock of material always

on hand for Repairing Wooden

and Metal Ships.





# Pintsch Gas Lighted Buoys

# BURN CONTINUOUSLY

FROM 80 TO 365 DAYS AND NIGHTS WITHOUT ATTEN-TION AND CAN BE SEEN AT A DISTANCE OF SIX MILES.

Brilliant & Steady Illumination. Economical & Reliable in Operation.

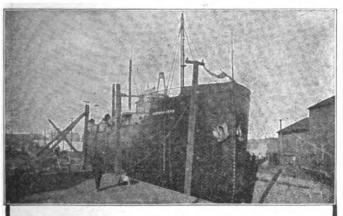
Adopted by the English, German, French, Russian and United States Light House Departments for Channel and Harbor Lighting; over 1900 gas buoys and gas beacons in service.

Controlled by the

# SAFETY CAR HEATING & LIGHTING COMPANY

160 Broadway,

NEW YORK CITY.

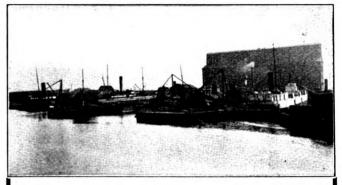


# Milwaukee Dry Dock Company

SHIP REPAIRS OF ALL KINDS

We have two ship yards offering every facility for the repair of both steel and wooden vessels. South Yard Dock is 450 ft. long on keel blocks; 460 ft. over all; 60 ft. width of gate and 16 ft. over sill. West Yard Dock is 312 ft. on keel blocks; 45 ft. width of gate and 12 ft. over sill. Rudder pit in each dock. Electric lights for night work.

> MAIN OFFICE AT SOUTH YARD Foot of Washington Street Telephone Main 3



# Announcement

Our plant having been thoroughly reorganized both as to management and equipment, we are enabled to do all kinds of ship repairs at reasonable cost to the owners, whose patronage is solicited with the guarantee of satisfaction in all particulars.

We call attention to our facilities for the construction of new vessels of all kinds, particularly dredging outfits, tugs, scows, fuel lighters, etc., plans for which we will furnish on application together with specifications and estimates of cost.

# The Buffalo Dry Dock Company

BUFFALO, NEW YORK

EDWARD SMITH, President EDWARD N. SMITH, Superintendent WILLIAM KNIGHT, Ass't. Sec'y and Treas.

Office Telephone, 515 Seneca. President's Office Telephone, 2329 Seneca President's Residence Telephone, 209 Bryant. Ass't Secy's Telephone, 324 North. Superintendent's Telephone, Bryant 209.

# THE TOLEDO SHIPBUILDING COMPANY

BUILDERS AND REPAIRERS OF

# SHIPS AND ENGINES

FRANKIE. KIRBY, CONSULTING ENGINEER.

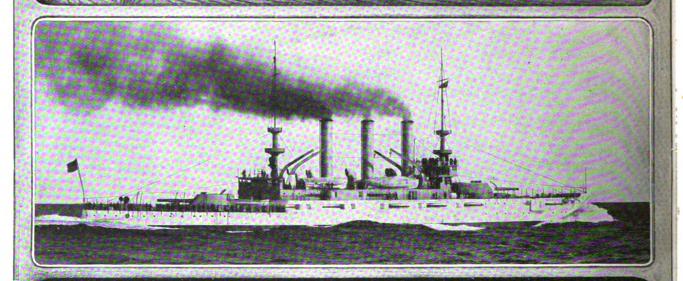
ALEXANDER MCVITTIE, PRESIDENT. CHAS. B. CALDER, GENERAL MANAGER. TOLEDO, OHIO

.H. S. WILKINSON, SECRETARY. L. C. SMITH, TREASURER.



# SHIPYAR

ITH ITS ACCOMPANYING DRY D WORKS, WAS CAREFULLY DESIGNED, OUIPPED AND COMPLETED FOR THE



CONSTRUCTION AND REPAIRING IN EVERY DETAIL OF

BATTLE SHIPS · ARMORED CRUISERS · PROTECTED CRUISERS GUN BOATS TORPEDO BOATS TORPEDO BOAT OCEAN LINERS PASSENGER STEAM ERS. FREIGHT CARRIERS. ETC. ETC.

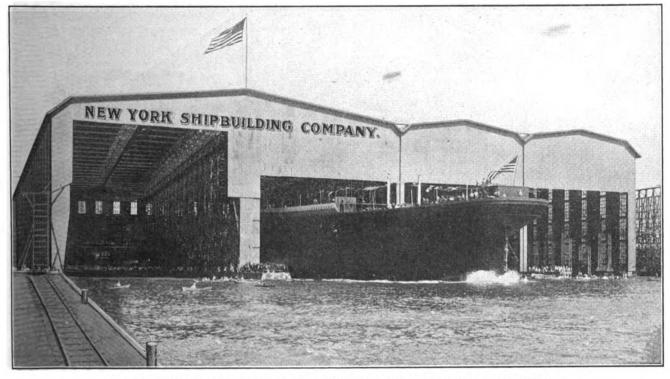
NEWPORT NEWS SHIPBUILDING & DRY DOCK CO. I BROADWAY NEW YORK - NEWPORT NEWS, VA.

# https://hdl.handle.net/2027/nyp.33433109947659

# New York Shipbuilding Company

Main Office and Works, Camden, N. J.

New York Office, 12 Broadway



Launch of "Mongolia," Pacific Mail S. S. Co., 615 feet long, 65 feet beam, 51 feet deep.

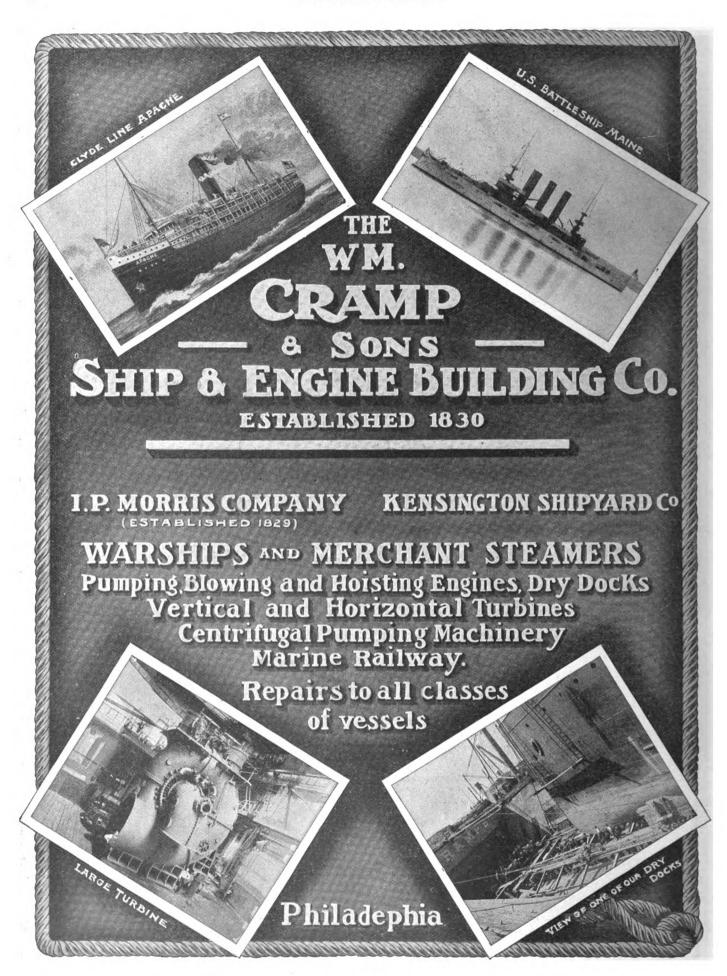
Builders of

# SHIPS, ENGINES, BOILERS AND HEAVY MACHINERY

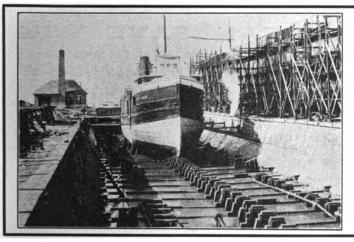
# Best Facilities for Repair Work

Pneumatic and Electric Tools; ample wharfage accommodation.

One Hundred Ton Crane Repairs done under Shelter







# Collingwood Shipbuilding Co.

COLLINGWOOD, ONTARIO.

# STEEL & WOOD SHIPS

Marine and Stationary Engines Boilers and Auxiliary Machines

Dry Dock 514 ft. Keel Blocks

ALEX. MCDOUGALL PRESIDENT

J. M. SMITH MANAGER

# **GREAT LAKES REGISTER**

FOR THE CLASSIFICATION OF STEEL AND WOODEN VESSELS.



COMBINED AND ISSUED IN CONNECTION WITH

# BUREAU VERITAS INTERNATIONAL REGISTER OF SHIPPING.

THE RATINGS OF GREAT LAKES REGISTER GO BEFORE AND ARE ACCEPTED BY THE LEADING UNDERWRITERS OF AMERICA AND EUROPE. VESSELS BUILT UNDER THE SUPERVISION OF ITS SURVEYORS WILL RECEIVE SPECIAL RATING, AND WILL ALSO BE PUBLISHED IN BUREAU VERITAS INTERNATIONAL REGISTER OF SHIPPING.

PLANS AND SPECIFICATIONS FURNISHED.

GREAT LAKES REGISTER SURVEYORS ARE ESTAB-LISHED AT ALL THE PRINCIPAL PORTS ON THE GREAT LAKES,

F. D. HERRIMAN, SURVEYOR GENERAL, \$20-822 Perry-Payne Building, . . . CLEVELAND, O. GHARLES E. PEOK.

WILLIAM A. PRIME.

# CHAS. E. & W. F. PECK

Insurance Brokers. Average Adjusters.

ESTABLISHED 1870. NEW YORK, 58 William Street,

BOSTON, 153 Milk St.
BUFFALO, 914 The Fidelity Bidg. CLEVELAND, 1006-1008 Rockefeller Bldg. CHICAGO, 1114-15 Royal Insurance Bidg.

C. T. BOWRING & CO., (Insurance) LTD., 5 and 6 Billiter Ave., LONDON, and at "LLOYD'S" LONDON. HULLS AND CARGOES.

We place insurances in the most advantageous markets, employing, in the interest of our clients and with equal facility, all Foreign and Home companies, at the best procurable rates and terms.

We Represent Only the Assured

#### Atlantic Mutual Insurance Company Atlantic Building, 51 Wall Street, New York

Insures against marine and inland transportation risk and will issue policies making loss payable in Europe and Oriental countries.

Ohartered by the State of New York in 1842, was preceded by a stock company of a similar name. The latter company was liquidated and part of its capital, to the extent of \$100,000, was used, with consent of the stockholders, by the Atlantic Mutual Insurance Company and repaid, with a bonus and interest, at the expiration of two years.

at the expiration of two years.

During its existence the company has insured property to the value of - - - - - \$21,108,343,494.00

Received premiums thereon to the extent of - 224,197,211.06

Paid losses during that period - - - 127,760,071.08

Issued certificates of profits to dealers - - 81,310,840.00

Of which there have been redeemed - - 73,744,440.00

Interest paid on certificates amounts to - 19,469,981.85

On Dec. 31, 1905, the assets of the company amounted to 12,716,427.62

The profits of the company report to the assured and are divided annually

The profits of the company revert to the assured and are divided annually upon the premiums terminated during the year, thereby reducing the cost of insurance.

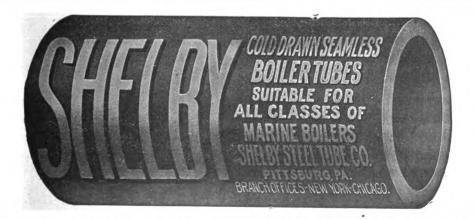
insurance.

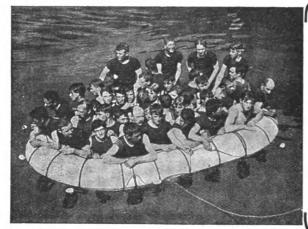
For such dividends, certificates are issued subject to dividends of interest until ordered to be redeemed, in accordance with the charter.

ANTON A. RAYEN, Pres.

CORNELIUS ELDERT, Vice-Pres.

G. STANTON FLOYD-JONES, Secretary.





8' x 12' FLOAT-45 PERSONS-450 CUBIC BOAT FEET

# WE CAN SAVE YOU

75% deck space 50% weight 90% cost of maintenance

#### THE CARLEY LIFE FLOAT

Constructed of Copper, Cork, Canvas and Cordage. Requires no davits or tackle.

Standard sizes range from six to sixty-seven persons capacity.

LIFE BOATS

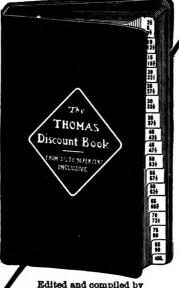
LIFE PRESERVERS

Send for Illustrated Catalogue.

# CARLEY LIFE FLOAT COMPANY

F 4 & 5 Produce Exchange Building, New York.





Edited and compiled by MILLARD T. THOMAS.

# It's in the Book

Don't stop to figure it out. Consult the Thomas Discount Book. It will save you dollars in time. The tables are complete, practical and accurate and will prove of great value in finding the net cost of goods—making discounts

for specified lists—making any specified discounts—comparing prices, etc. In fact, there is no end to their application. Place one on your desk.

Sent post prepaid.

Cloth \$1.00

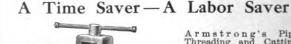
Leather \$1.25

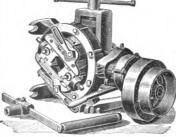
THE PENTON PUBLISHING COMPANY
CLEVELAND



fitted with Star Metaline Bushings and Side Bearings, which keep the sheaves from heating, make them run true and together with the rounded edges of the shells, soon save more than their cost, by preserving the rope.

BOSTON & LOCKPORT BLOCK CO.





Armstrong's Pipe Threading and Cutting Machines do their work quicker and easier than is possible with a die and stock.

Where much pipe work is done a machine pays for itself in a very little while.

Sizes taking up to 6 in. pipe.

Write for catalog.

The Armstrong Mfg. Company
314 Knowlton St. BRIDGEPORT, CONN.

# http://www.hathitrust.org/access )24-08-27 23:30 GMT Google-digitized 2024-08-27

0.0

# THE ELEMENTS OF **NAVIGATION**

A short and complete explanation of the standard methods of finding the position of a ship at sea and the course to be steered

# Designed for the instruction of beginners

W. J. HENDERSON, Illustrated.

The need of a short, simple, and yet comprehensive book on the art of navigating a ship has led the author to undertake the preparation of the present work. The aim of the book is to instruct the beginner, leading him step by step from the first operations to the perfection of the art as found in the Sumner method. The instructions have been made as terse as possible, and yet the author believes that clearness has not been sacrificed. Fundamental principles have been explained, but no attempt has been made to elucidate the higher mathematics on the subject. Students who have tried to learn navigation from books like Captain Lecky's inimitable "Wrinkles in Practical Navigation", which is addressed to navigators only, or from Bowditch's "American Navigator", which is only for mathematicians, will, it is hoped, appreciate this little book. The explanations of the uses of the tables and the "Nautical Almanac" are a new feature in a work of this kind.

# **CONTENTS**

Introduction Variation Deviation How to find the Deviation The Lead-Line Charts Chart Sailing Dead-Reckoning Examples for Practice Working a Traverse Hove to Shaping the Course Navigation by Observation Navigation by Observation Sextant Adjustments Index Error Hints on Taking Altitudes Correcting the Altitude The Chronometer Apparent and Mean Time-The Latitude by Meridian Altitude Latitude by Meridian Altitude of a Star Latitude by Meridian Altitude of a Planet Latitude by Meridian Altitude of the Moon Meridian Altitude below the Pole Latitude by Ex-Meridian Altitude of the Sun

Latitude by the Polestar

Compass Error by Azimuths Longitude by Chronometer (or Time) Sight Remarks on Longitude Longitude by Sunrise and Sunset Sights Chronometer Sight of a Star Sumner's Method
Example of Sumner's Method
with the Sun Example of Sumner Lines with Two Stars Great-Circle Sailing Distance and Danger Angles Allowance for Tides Keeping the Log Rating a Chronometer Care of a Chronometer Hints on Conducting Voyages Examples for Practice:

Dead-Reckoning Shaping Course by Mercator's Sailing Latitude by Meridian Altitude of Sun Latitude by Meridian Altitude Latitude by Meridian Altitude Below the Pole Latitude by Ex-Meridian Alti-Latitude by the Polestar Longitude by Chronometer Sight

PRICE \$1.00

The Marine Review Cleveland

# S. Injectors

The U.S. Automatic Injector isn't "the Best" simply because the U.S. Government adopted it. The U.S. Government adopted the U.S. Automatic because it is the best.

Scientific tests prove that the U.S. Automatic has 100 per cent efficiency, that it is ideally perfect, that there is absolutely no waste.

Continuous use has demonstrated the U.S. Automatic the most re-

liable and trusworthy Injector on the market. That's why over 200,000 engineers endorse it as the Best.

Note these Facts: - The U. S. Automatic has wider range, feeds hotter water, is the only injector with a drip cock—a mighty valuable feature, and the only injector accompanied by a bona fide certificate of range and capacity. Want more fac's?

Write for the Engineer's Red Book-Sent Free! This modest little booklet deals in facts—not theories. It has proved helpful to thousands of engineers. It will prove valuable to you. Free for the asking.



# LUNKENHEIMER REGRINDING VALVES

The Embodiment of Perfection



Self contained. No extra parts required to repair them when worn. A few minutes spent in regrinding and they are as good as new.

If your local dealer cannot furnish them, notify us.

# The Lunkenheimer Co.

LARGEST MANUFACTURERS OF HIGH-GRADE ENGINEERING SPECIALTIES IN THE WORLD.

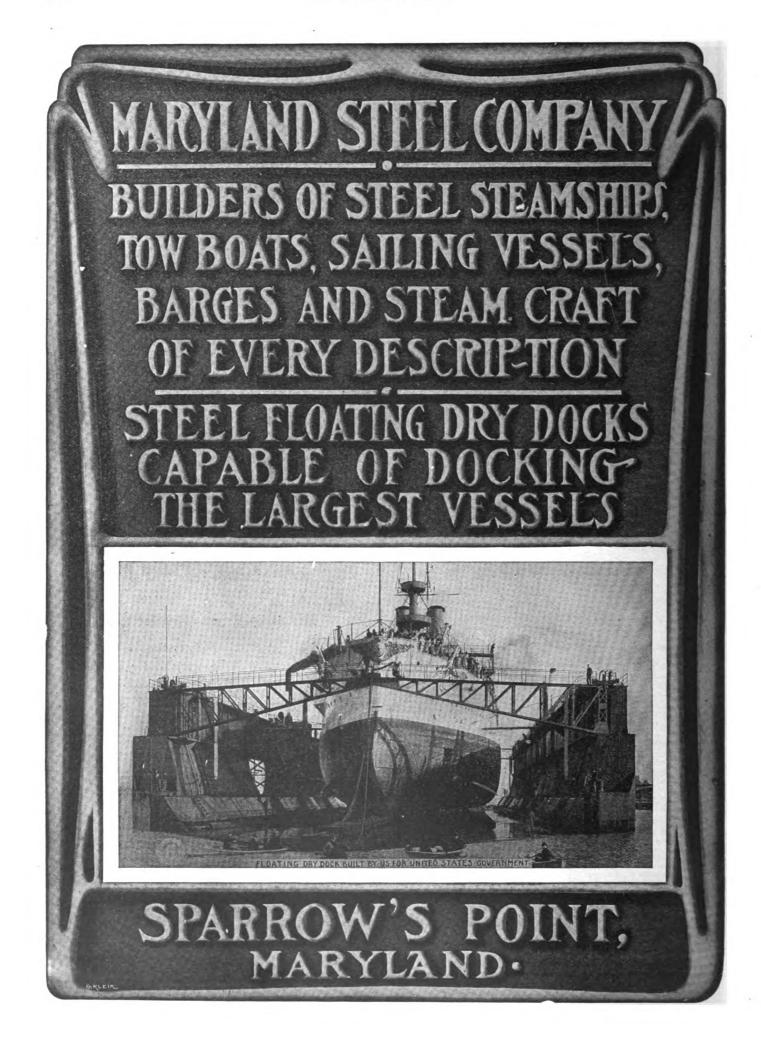
General Offices Cincinnati, Ohio, U.S.A.

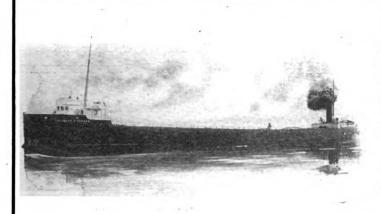
Branches: NEW YORK, 66-68 FULTON ST. LONDON, S. E., 35 GREAT DOVER ST.

1 M. R.









# Tells the Story Better Than We Could

Cleveland, Ohio, May 12, 1906.
The National Metallic Packing Co., Oberlin, Ohio
Gentlemen: In reply to your favor of the 8th, regarding six sets of National Metallic Packing installed on the new Triple Expansion Engine in my charge, I can not speak too highly of the merits of your packing. I have used all the different makes of metallic packing in the past twenty years and I never found any of them absolutely tight until I put yours on. The three rods and three valve stems have a polish like a mirror, and with less friction than with any other packing, and I do not see why it will not run from eight to ten years. I can recommend this packing to all engineers as a first-class packing.

Yours truly, FRED M. HARMON,
Chief Engineer S. S. Chas. S. Hebard.

# The National Metallic Packing Co. OBERLIN, O.

Nacey & Hynd, 208-9 Western Reserve Building Cleveland, O. Eugene Passono, 1210 Erie St., Toledo, Ohio. General agent. J. A. Cameron, 1540 First National Bank Building, Chicago, Ill.



# "RAINO" For Hard Service

"Raino" is a guaranteed absolutely waterproof cloth.

For ships' officers, yachtsmen, seamen, etc., it is the ideal

waterproof garment.
"Raino" is very light, clean
and neat looking. Far superior to either oilskins or rubber. It will not rot, nor is it stiff, heavy, oily or foul smelling.

After two years of the hardest kind of army and naval service tests in all parts of the world hundreds of officers declare it the most durable waterproof garment made.

"Raino" officer's Long Coat \$6.30 net "Raino" Medium Coat..... 5.40 "
"Raino" Jacket...... 4.50

Write for Samples and Price List P.

E. A. ARMSTRONG MFG. CO.

(Makers of the famous Armstrong Uniforms.)
Write for prices on Uniforms.

315-321 Wabash Ave., Chicago.

ARMSTRONG GUARANTEE.

eek's trial. Rain, Hose or Shower. If not satisfactory express back at xpense. Money returned, Show our faith.

# Do You Wear Shoes



Lorain, O. Conneau O. Francis Bros. E. Johnson Ashtabula, O. J. E. Scoville Brooklyn, O. E. H. Wlecke Painesville, O. Jones & Nye Elmore, O. A. Weis & Son

Amherst, Ohio Elyria, Ohio Sandusky, Ohio

Jacob Baus Wm. E. Smith W. O. Stubig





# OTIS STEE

SHIP PLATES

FLANGE PLATES

TANK PLATES

STEEL CAR AXLES

FORGINGS OF ALL KINDS

"Otis" Fire Box Plates a Specialty.

STEEL CASTINGS FROM 100 TO 100,000 LBS.

OTIS STEEL CO., Ltd., Head Office and Works, CLEVELAND, O.

New York: Thorpe, Platt & Co., 97 Cedar St. Montreal: Homer Taylor, 183 St. James St.

AGENCIES.

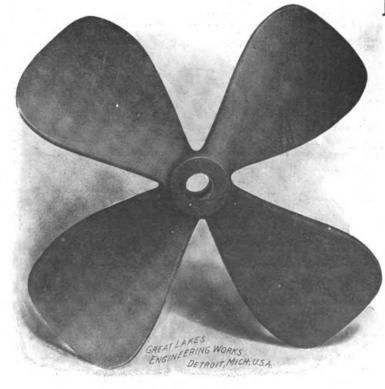
St. Louis: C. A. Thompson, 516 N. Third St San Francisco: John Woodlock, 154-156 First St.

Detroit: George W. House, Union Trust Building.

# CREAT LAKES ENGINEERING WORKS



Steel Ship Builders
Floating Dock
Marine Engines
Marine Repairs
Hydraulic Dredges
Hydro Carbon System
Propeller Wheels



# Semi=Steel Propeller Wheels==

made either Solid or improved Sectional Type.

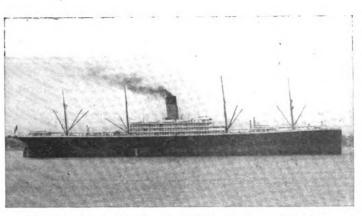
Our Wheels possess

many points of merit not found in other makes.

Quick deliveries guaranteed.

# https://hdl.handle.net/2027/nyp.33433109947659 http://www.hathitrust.org/access use#pd-google Generated on 2024-08-27 23:41 GMT Public Domain, Google-digitized

# Hyde Windlasses and Capstans



Steamship Minnesota equipped with Hyde Windlass and Capstans.

Selected for the Minnesota and Dakota of the Great Northern Steamship Co.'s fleet—the largest vessels ever built in the United States. They are also being installed on nearly all of the vessels now building for the Navy Department, Revenue Cutter service, Lighthouse Board and the United States Coast Survey.

Reason-Their Superiority.

Send for Illustrated Catalog.

# HYDE WINDLASS COMPANY

BATH, MAINE

# Geo. L. McCurdy

169 Jackson Boulevard

CHICAGO

ILLINOIS

# INSURANCE

**HULLS and CARGOES** 

DIRECT REPPESENTATIVE OF LEADING AMERICAN AND FOREIGN UNDERWRITERS



# Lucas' Questions and Answers for Marine Engineers

Second Revised Edition.

More than a Hundred Illustrations.

In this second edition, in response to numerous requests, the publishers have added several subjects under the headings "Various Principles of Mathematics useful to the Engineer and Machinist," the United States regulations relating to the examination of Engineers for licenses as Chief, First, Second and Third Engineers, prescribed by the Board of Supervising Inspectors, an introduction relating to the Qualifications and Opportunities for entering the Government and Mercantile Marine Engine Room Service.

Price \$2.00 Postpaid to any address.

Money refunded if book is not entirely satisfactory.

Marine Review - Cleveland, O.

# WANTED and FOR SALE

# THAT'S OUR BUSINESS

Buying, Selling, Chartering BOATS.

If you desire to charter, sell or buy let us help you

#### CHICAGO STEAMER EXCHANGE,

No. 144 So. Water Street, Long Distance Phone Cent. 5046. GNICAGO.

#### WANTED.

WANTED.—Agents in every state to sell a new form (paste) packing as a side line. Used anywhere in place of sheet packing at one-fourth the cost. Liberal commission. Woodard Paste Packing Co., Owosso, Mich.

WANTED. — Good second hand boiler for 500M lumber barge, also hoisting engine. M. E. Helgeson, 230 N. Park Ave., Chicago, Ill.

#### FOR SALE.

#### VERTICAL ENGINE.

One triple-expansion marine type vertical engine, 111/4-inch, 18-inch, 29 x 18-inch stroke. Inquire, Public Lighting Commission, No. 40 Atwater Street East, Detroit, Mich.

#### For Sale.

1,000 h. p. fore and aft Neafie & Levy compound Engine; surface condenser; independent pumps.

Two 12-foot Scotch Boilers.
One 13½-foot Scotch Boiler.
One 10 16-25 x 16 triple expansion Engine.

Three 150-h. p. Almy Boilers.
One 200-h. p. Tregurtha Boiler.
One 14 30 x 24 fore and aft Engine and condenser.

One Williamson steering Engine.
One 10 k. w. electric lighting Set.
One 15 k. w. electric lighting Set.
One Providence Windlass, 50 fathoms
11/2 in, chain.

Two thrust Shafts and Bearings, 81/2 in.

MARVIN BRIGGS,

17 Battery place, New York, N. Y.

## Steamer for Sale Cheap.

The lighthouse steamer Haze, 145 ft. long, 27-ft. beam, 9-ft. draught, 500 tons capacity, 300 horsepower engine and boiler, suitable for passenger or freight business, fully equipped. Steam capstan, donkey boiler. Jacob Ullman, 46 Lloyd street, Buffalo, N. Y.

FOR SALE CHEAP. — Package freight hoisting outfit, engine, shafting, and friction drums. Large Russell & Watson Steel Range. M. E. Helgeson, 230 N. Park Ave., Chicago, Ill.

#### RAFTING CHAIN.

FOR SALE.—700 I in. Bloom Chain, with shackles; hand-made Zug iron, every link tested; as good as new.

Two Rivers Woodenware Co., Two Rivers, Wis.

#### STEAMER PEERLESS.

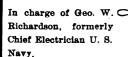
FOR SALE.—Steamer Peerless, fully equipped for freight and passengers. Address, D. E. Sullivan, suite 1212, Ashland block, Chicago, Ill.

Boilers for Sale.
Five Scotch Boilers, allowed 160 lbs, steam. Good as new. ERIE MA-CHINERY CO., 729 Garfield Bldg, Cleveland, O.

#### GOULD'S NAUTICAL SCHOOL, 265 MARCY AVE., CLEVELAND, O. Established 1894.

Full and complete instructions in Lake and Ocean Navigation; also the Laws of Magnetism as applied to the compass, its effects, adjustments, etc. Will open about Dec. 10th.

# Engineering





# **Navigation**

In charge of W. J. WILSON, Graduate of U. S. Naval Academy, Annapolis, Md.

# LEARN RIGHT WHILE YOU'RE AT IT

A full and complete course of instruction in Lake and Ocean Navigation and Marine and Stationary Engineering. Also special branches taught those desiring to qualify themselves for better positions in the Marine Service. Students taught by correspondence. Students may begin at any time. Diplomas will be issued to all graduates passing satisfactory final examinations. Send for Circular.

# CHICAGO NAUTICAL SCHOOL 11th Year

MABONIC TEMPLE, CHICAGO, ILL.

W. J. WILSON, Principal (Late Lieutenant, U. S. N.)

# MARINE MFG. & SUPPLY CO.

157 and 158 South St., New York.

# SHIP FITTINGS AND SUPPLIES

CAPSTANS, WINDLASSES, STEERING APPARATUS, ENGINE ROOM TELEGRAPHS, BRASS AIR PORTS, DEAD LIGHTS, PUMPS, ETC.

Catalogue A—Air Ports, Ventilators, etc. Catalogue B—Windlasses, Pumps, etc. Catalogue C—Steering Apparatus. Others in course of preparation.



# Wrecking Steamer FAVORITE

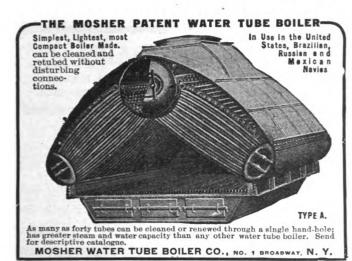
# Located at St. Ignace this Year.

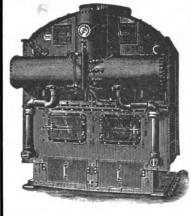
The Wrecking Steamer FAVORITE, Alex. Cunning, Master, will be stationed during season 1906 at ST. IGNACE, MICH. A Long-Distance Telephone has been installed on board the steamer. When at her home dock, the steamer can be reached by telephone any time day or night, 'Phone Number 63, and in absence of steamer full information as to the steamer may be obtained by telephoning to residence of Capt. Cunning, St. Ignace.

The Favorite and her equipment were thoroughly overhauled during the past winter, and are in first class condition to do outside work.









350 STEAM VESSELS

Now Equipped With

#### ALMY'S PATENT SECTIONAL

**W**ater Tube Boilers Bear Evidence of Their

**Excellent Qualities** 

ALMY WATER-TUBE BOILER CO

PROVIDENCE, R. I.



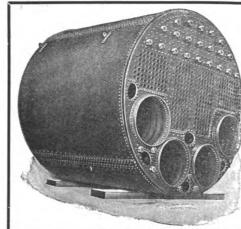
# Taylor Water Tube Boiler Co.

Vertical Tubes, sectional, large steam space and liberating area.

Fire box, combustion chamber, and course for the furnace gases similar to the Scotch Marine. Free circulation type.

Send for full description.

322 Franklin St. DETROIT, MICH.



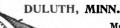
# MARINE BOILERS

OF ALL TYPES

KINGSFORD **FOUNDRY&** MACHINE WORKS.

Oswego, N. Y.

# Northwestern Steam Boiler & Mfg. Co.





#### **BOILERS, ENGINES** AND MACHINERY

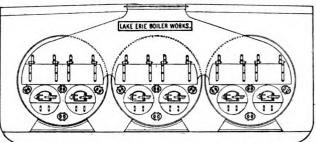
Special facilities for Marine Repairs promptly attended to Night or Day.

> We carry a complete line of Marine and Engineers' Supplies.

TELEPHONES: OFFICE AND WORKS, 615.
RESIDENCE CALLS: M. A. RYAN, Pres. and Gen'l Mgr., 776-R.
J. H. OPPERMAN, Secretary, 579-R; E. KRIZ, Superintendent, 557-M.

#### LAKE ERIE BOILER WORKS

RICHARD HAMMOND, President



THE BEST EQUIPPED PLANT IN AMERICA FOR THE MANUFACTURE OF MODERN MARINE BOILERS BUFFALO, N.Y.



# Ritchie Liquid Compass

The Standard Liquid ine Standard Liquid Compass used exclusive-ly by the U.S. Navy for over 35 years. Over 32,000 used in Merchant Service.

Made in all sizes and styles, from 2 to 12 inches diameter of card. All compasses made by us have our name printed below the North point or prominently upon the card. None other are genuine. Latest form with four or six needles, the best instrument for iron ships. For sale by ship chandlers and nautical instrument dealers. Catalogue free.

E. S. RITCHIE & SONS, Brookline, Mass., U. S. A. MANUFACTURERS OF NAUTICAL AND PHYSICAL APPARATUS.

# BOTH HOLLOW AND SOLID, MADE OF BEST QUALITY DOUBLE REFINED CHARCOAL RON OR STEEL. CUYAHOGA FALLS. O. U.S.A. IRON OR STEEL.

#### and Coal Economy Safety

are realized by our Hollow Stay Bolts Steam from the center of a broken Hollow bolt always gives positive warning, hence

SAFETY
Air passing into the firebox through the hollow bolt helps combustion, hence

Tell-tale holes clog up. Hollow stays "never."
Passage of air always keeps the holes open.

Send for free literature.

Falls Hollow Staybolt Company Cuyahoga Falls, Ohio

#### **BUYERS' DIRECTORY** THE MARINE TRADE. **OF**

For a more complete classification than that represented by advertisers in The Marine Review, see the BLUE BOOK OF AMERICAN SHIPPING, Marine and Naval Directory of the United States, published by The Marine Review, Cleveland.

[See accompanying Index of Advertisers for full addresses of concerns in this Directory.]

		`
AIR COMPRESSION, HOISTS. Great Lakes Engineering Works Detroit.	BOILER MANUFACTURERS.  Almy Water Tube Boiler Co  Providence, R. I.	CAPSTANS.  American Ship Windlass Co  Providence R I
AIR PORTS, DEAD LIGHTS, ETC.	American Ship Building Co	Dake Engine Co
Marine Mfg. & Supply Co  New York.  AIR PUMPS AND APPLIANCES.	Atlantic Works East Boston, Mass. Briggs, Marvin New York. Chicago Ship Building Co Chicago.	Hyde Windlass CoBath, Me. Marine Mfg. & Supply Co
Fore River Ship & Engine Co	Cramp, Wm. & Sons Philadelphia. Detroit Ship Building Co Detroit.	New York.  CEMENT, IRON FOR REPAIR-
Great Lakes Engineering Works Detroit.	Fletcher, W. A. & Co	ING LEAKS. Smooth-On Mfg. Co
ANCHORS. Bowers, L. M. & Co	Fore River Shipbuilding CoQuincy, Mass.	Jersey City, N. J. CHAIN SURVEYORS, HOISTS.
Binghamton, N. Y.	Great Lakes Engineering Works Detroit.	Brown-Hoisting Machinery Co Cleveland. General Electric Co
ANTI-FRICTION METALS. Cramp, Wm. & SonsPhiladelphia.	Kingston Foundry & Machine WorksOswego, N. Y.	Schenectady, N. Y.
ARTIFICIAL DRAFT FOR BOILERS. American Ship Building Co	Lake Erie Boiler WksBuffalo  Maryland Steel Co  Sparrow's Point, Md.	CHAIN HOISTS.  Boston & Lockport Block Co  Boston, Mass.
Detroit Ship Building CoDetroit.	McLaughlin Iron Wks Ashtabula, O. Milwaukee Dry Dock Co	CHARTS.  Penton Publishing CoCleveland
Great Lakes Engineering Works Detroit.	Mosher Water Tube Co. New York.	CHECK VALVES.
ASH EJECTORS. Great Lakes Engineering Works	Newport News Ship Building Co	Scoville Check Valve Co., Ashtabula, O. CLOCKS (Marine and Ship's Bell)
Detroit.	New York Shipbuilding Co	AND CHRONOMETERS. Ritchie, E. S. & Sons Brookline, Mass.
ATTORNEYS AND PROCTORS IN ADMIRALTY. Gilchrist, Albert JCleveland.	Northwestern Steam Boiler & Mfg. Co Duluth, Minn. Quintard Iron Works Co	CLOTHING, WATERPROOF.
Goulder, Holding & Masten		Armstrong, E. A. Mfg. CoChicago.  COAL PRODUCERS AND
Hoyt, Dustin & KelleyCleveland.  Jenkins, Russell & Eichelberger  Cleveland.	Co New York. Superior Ship Building Co	SHIPPERS.  Hanna, M. A. & CoCleveland.  Pickands, Mather & CoCleveland.
Kremer, C. E	Taylor Water Tube Boiler Co  Detroit.	Pittsburg Coal CoCleveland COAL AND ORE HANDLING
Maytham, FrankBuffalo Shaw, Warren, Cady & Oakes Detroit.	Toledo Ship Building CoToledo.	MACHINERY.  Brown-Hoisting Machinery Co
White, Johnson, McCaslin & Cannon	BOILER RIVETS.  Bourne-Fuller CoCleveland.	COMPASSES.
BAROMETERS, MARINE GLASSES, ETC.	`BOILER STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.	Ritchie, E. S. & Son Brookline, Mass.
Ritchie, E. S. & Sons	Falls Hollow Staybolt Co	Great Lakes Engineering Works  Detroit.
BLOCKS, SHEAVES, ETC. Boston Lockport Block Co	BRASS AND BRONZE CASTINGS. Cramp, Wm. & SonsPhiladelphia. Fore River Ship & Engine Co	Wheeler Condenser & Engineering Co New York.
BLOWERS.	Great Lakes Engineering Works	CONTRACTORS FOR PUBLIC WORKS.  Breymann Bros., G. HToledo.
American Blower Co., Detroit, Mich.	Lunkenheimer CoCincinnati.	Buffalo Dredging CoBuffalo. Dunbar & Sullivan Dredging Co
BOAT BUILDERS. Drein, Thos. & Son	BRIDGES, BUILDERS OF. Scherzer Rolling Lift Bridge Co	Great Lakes Dredge & Dock Co
	BUCKETS, ORE AND COAL.	Hickler Bros Chicago.  Sault Ste. Marie, Mich.
Truscott Boat Mfg. Co	Brown Hoisting & Conveying Machine Co	Hubbell Co., H. W. Saginaw, Mich Smith Co., L. P. & J. A. Cleveland.
BOILER COMPOUNDS. The Bird-Archer CoNew York	CABIN AND CABINET FINISHING WOODS.	Starke Dredge & Dock Co., C. H Milwaukee. Standard Contracting Co Cleveland.
Dearborn Drug & Chemical Works	Martin-Barriss CoCleveland.  CANVAS SPECIALTIES.	Sullivan, M Detroit
Lake Erie Boiler Compound CoBuffalo	Baker & Co., H. HBuffalo. Bunker, E. ANew York.	CORDAGE.  Baker & Co., H. HBuffalo. Upson-Wakon CoCleveland.
State Manufacturing CoCleveland.	Upson-Walton CoCleveland.	



# http://hdl.handle.net/2027/nyp.33433109947659 http://www.hathitrust.org/access use#pd-google Generated on 2024-08-27 23:32 GMT Public Domain, Google-digitized

# G. H. Breymann & Bro's

CONTRACTORS FOR PUBLIC WORKS

Dredging, Dock Building, Etc.

5. 6 AND 7 MARINE BUILDING TOLEDO, OHIO.

# Hickler Brothers

SAULT STE. MARIE, MICH.

#### MARINE RAILWAY

Capacity, 1,000 tons. Draft, 71/2 ft. forward, 131/4 ft. aft. Length on keel blocks, 180 ft.; over all, 190 ft.

Machine Shop, Foundry and Steam Forge, Dredges, Drill Boats and Derrick Scows.

# Buffalo Dredging Co.

**GENERAL CONTRACTORS** 

---ON-SUBMARINE WORK

Office D. S. Morgan Bldg.

BUFFALO, N. Y.

# H. W. HUBBELL CO.

Submarine Work of all kinds

Dredging Hard Material a Specialty.

**SAGINAW** 

MICH.

#### **Dunbar and Sullivan**

# DREDGING

Company BUFFALO, N. Y.

REMOVE SUBMARINE ROCK OR EARTH

#### Steamboat Fuel at Ashtabula

Large Supplies of Best Quality.



Fuel Scow with elevators and discharging spouts. Storage of 800 tons. Discharges 250 tons an hour into steamers while unloading cargo.

M. A. Hanna & Co., Miners and Shippers. Main Office, Perry-Payne Bldg., Cleveland.

# "Steam Turbines"—

An important reference work on scientific Steam Turbine construction with an appendix on Gas Turbines, and the future of Heat Engines. Contains 435 pages 6 x 9 inches, 241 cuts and 3 lithograph tables. Bound in heavy cloth. Price \$4.50.

By DR. A. STODOLA ZURICH

MARINE REVIEW CLEVELAND

Order from

Translated by DR. LOUIS C. LOEWENSTEIN Lehigh University



# Buyers' Directory of the Marine Trade.—Continued.

CORK JACKETS AND RINGS.	ENGINE BUILDERS—Continued.
Armstrong Cork CoPittsburg, Pa. Kahnweiler's Sons, DNew York.	Lockwood Mfg. Co
•	East Boston, Mass. Maryland Steel Co
CRANES, TRAVELING. Brown-Hoisting Machinery Co	Sparrows Point, Md.
Cleveland.	Milwaukee Dry Dock Co., Milwaukee. Mosher, Chas. DNew York.
	Newport News Ship Building Co
DIVING APPARATUS.  Morse, A. J. & SonBoston.	New York Ship Building Co
Schrader's Son, Inc., A. New York.	New York Ship Building Co
DREDGING CONTRACTORS.  Breymann & Bros., G. HToledo.	Co Duluth, Mich.
Buffalo Dredging CoBuffalo.	Quintard Iron Works Co., New York.
Dunbar & Sullivan Dredging Co	Roach's Ship YardChester, Pa. Sheriffs Mfg. CoMilwaukee.
Great Lakes Dredge & Dock Co	Superior Ship Building Co
Chicago.	Thropp, J. E. & Sons Co
Hickler Bros.	Trenton, N. J.
Sault Ste. Marie, Mich. Hubbell Co., H. W. Saginaw, Mich.	Toledo Ship Building CoToledo.
Starke Dredge & Dock Co., C. H	Trout, H. GBuffalo.
Milwaukee.	
Sullivan, MBuffalo.	ENGINE ROOM TELEGRAPH
DREDGING MACHINERY.	CALL BELLS, ETC. Cory, Chas. & Son New York.
Quintard Iron Works Co. New York.	Marine Mfg. Supply Co., New York.
Superior Iron WorksSuperior, Wis.	•
DRY DOCKS.	ENGINEERING SPECIALTIES
American Ship Building Co	AND SUPPLIES.  Lunkenheimer Co Cincinnati.
Atlantic Works East Boston, Mass.	Northwestern Steam Boiler & Mfg.
Buffalo Dry Dock CoBuffalo.	Co Duluth, Minn.
Chicago Ship Building Co	
Cramp Wm & Sons Philadelphia	ENGINEERS, MARINE, MECHANICAL, CONSULTING.
Cramp, Wm. & Sons. Philadelphia. Detroit Ship Building Co	Furstenau, M. C Philadelphia.
Great Lakes Engineering Works Detroit.	Hynd, Alexander Cleveland.
Great Lakes Engineering Works Detroit	Hunt, Robt. W. & CoChicago.
Lockwood Mfg. Co	Kidd, JosephDuluth, Minn. Mosher, Chas. DNew York.
East Boston, Mass.	Nacey, James Cleveland.
Milwaukee Dry Dock Co	Roelker, H. B
Newport News Ship Building Co	Wood, W. JChicago.
	FANS.
Superior Ship Building Co	American Blower Co., Detroit, Mich.
Superior, Wis.	Timerican Brower Co., Betroit, Mich.
Tietjen & Lang Dry Dock Co	FEED WATER PURIFIERS AND
Toledo Ship Building CoToledo.	HEATERS.
	Ross Valve CoTroy, N. Y. Wheeler Condenser & Engineering
DYNAMOS.  General Electric Co	Co New York.
Schenectady, N. Y.	DIVERSIDES DOD TAKES OF CO
	FIXTURES FOR LAMPS, OIL OR ELECTRIC.
ELECTRIC HOISTS AND CRANES.	General Electric Co
General Electric Co	Schenectady, N. Y.
Schenectady, N. Y.	FORGINGS FOR CRANK, PRO-
ELECTRIC LIGHT AND POWER	FORGINGS FOR CRANK, PRO- PELLER OR THRUST
PLANTS.	SHAFTS, ETC. Cleveland City Forge & Iron Co
General Electric CoSchenectady, N. Y.	
	Fore River Shipbuilding Co
ENGINE BUILDERS, MARINE.	Quincy, Mass.
American Blower Co., Detroit, Mich.  American Ship Building Co	FLUE WELDING.
Cleveland.	Fix's S. SonsCleveland.
Atlantic Works, East Boston, Mass.	PHELING COMPANIES AND
Briggs, Marvin New York. Chicago Ship Building Co., Chicago.	FUELING COMPANIES AND COAL DEALERS.
Chase Machine CoCleveland.	Hanna, M. A. & CoCleveland.
Cramp, Wm. & Sons, Philadelphia.	Parker Bros. Co., LtdDetroit. Pickands, Mather & Co., Cleveland.
Detroit Ship Building Co., Detroit. Fletcher, W. & A. Co., Hoboken, N. J.	Pittsburg Coal CoCleveland.
Fore River Shipbuilding Co	Smith, Stanley B., & Co., Detroit.
Quincy, Mass.	Toledo Fuel Company, Toledo, O.
Great Lakes Engineering Works Detroit, Mich.	FURNACES FOR BOILERS.
Ilall Bros Philadelphia.	Continental Iron Works, New York.

ENGINE BUILDERS—Continued.	GAS BUOYS.
ckwood Mfg. Co	Safety Car Heating & Lighting Co
East Boston, Mass.	New York.
ryland Steel Co	
Sparrows Point, Md.	GAS AND GASOLINE ENGINES.
lwaukee Dry Dock Co., Milwaukee.	Chase Machine CoCleveland.
osher, Chas. DNew York.	GAUGES, STEAM AND VACUUM.
wport News Ship Building Co Newport News, Va.	Lunkenheimer Co Cincinnati.
w York Ship Building Co	
	GAUGES, WATER.
rthwestern Steam Boiler & Mig.	Lunkenheimer Co Cincinnati, O.
Co Duluth, Mich.	CENEDATING SETS
intard Iron Works Co., New York.	GENERATING SETS. General Electric Co
ach's Ship YardChester, Pa.	
eriffs Mfg. CoMilwaukee.	······································
perior Ship Building Co	GRAPHITE.
ropp, J. E. & Sons Co	Dixon Crucible Co., Joseph
Trenton, N. J. ledo Ship Building CoToledo.	Jersey City, N. J.
ledo Ship Building CoToledo.	HAMMEDO OTTAN
out, H. GBuffalo.	HAMMERS, STEAM. Chase Machine CoCleveland.
	Chase machine CoCleverand.
ENGINE ROOM TELEGRAPH	HEATING AND VENTILATING
CALL BELLS, ETC.	APPARATUS.
ry, Chas. & SonNew York. rine Mfg. Supply Co., New York.	
Time mig. Supply Co., New Tork.	American Blower Co., Detroit, Mich.
NGINEERING SPECIALTIES	HOISTS FOR CARGO, ETC.
AND SUPPLIES.	American Ship Building Co
nkenheimer Co Cincinnati.	Cleveland.
rthwestern Steam Boiler & Mfg.	Brown Hoisting Machinery Co Cleveland.
Co Duluth, Minn.	
	Chase Machine CoCleveland.
ENGINEERS, MARINE,	Dake Engine Co
ECHANICAL, CONSULTING.	Grand Haven, Mich. General Electric CoNew York.
rstenau, M. C Philadelphia.	Hyde Windlass CoBath, Me.
nd, Alexander Cleveland.	Marine Iron CoBay City.
nt, Robt. W. & CoChicago. ld, JosephDuluth, Minn.	
sher, Chas. DNew York.	HOLLOW STAYBOLT IRON.
cey, James Cleveland.	Falls Hollow Staybolt Co
elker, H. B	Cuyahoga Falls, O.
ood, W. JChicago.	HYDRAULIC DREDGES.
•	Great Lakes Engineering Works
FANS.	Detroit.
nerican Blower Co., Detroit, Mich.	HYDRAULIC TOOLS.
ED WATER PURIFIERS AND	Watson-Stillman Co., The New York.
HEATERS.	Watson-Stillman Co., The New York.
HEATERS. ss Valve CoTroy, N. Y.	Watson-Stillman Co., The New York.
HEATERS. ss Valve CoTroy, N. Y. neeler Condenser & Engineering	Watson-Stillman Co., The
HEATERS. ss Valve CoTroy, N. Y.	Watson-Stillman Co., The
HEATERS. ss Valve CoTroy, N. Y. neeler Condenser & Engineering CoNew York.	Watson-Stillman Co., The New York.
HEATERS. ss Valve CoTroy, N. Y. neeler Condenser & Engineering	Watson-Stillman Co., The
HEATERS.  ss Valve CoTroy, N. Y. neeler Condenser & Engineering CoNew York.  XTURES FOR LAMPS, OIL OR ELECTRIC. neral Electric Co	Watson-Stillman Co., The
HEATERS. ss Valve CoTroy, N. Y. neeler Condenser & Engineering CoNew York.  XTURES FOR LAMPS, OIL OR ELECTRIC.	Watson-Stillman Co., The
HEATERS.  ss Valve CoTroy, N. Y. neeler Condenser & Engineering CoNew York.  XTURES FOR LAMPS, OIL OR ELECTRIC. neral Electric Co Schenectady, N. Y.	Watson-Stillman Co., The
HEATERS. ss Valve CoTroy, N. Y. neeler Condenser & Engineering CoNew York.  XTURES FOR LAMPS, OIL OR ELECTRIC. neral Electric Co Schenectady, N. Y.  PRGINGS FOR CRANK, PRO-	Watson-Stillman Co., The
HEATERS.  ss Valve CoTroy, N. Y. neeler Condenser & Engineering CoNew York.  XTURES FOR LAMPS, OIL OR ELECTRIC. neral Electric Co Schenectady, N. Y.  PRGINGS FOR CRANK, PRO- PELLER OR THRUST	Watson-Stillman Co., The
HEATERS. ss Valve CoTroy, N. Y. neeler Condenser & Engineering CoNew York.  XTURES FOR LAMPS, OIL OR ELECTRIC. neral Electric Co Schenectady, N. Y.  PRGINGS FOR CRANK, PRO-	Watson-Stillman Co., The
HEATERS. ss Valve CoTroy, N. Y. neeler Condenser & Engineering CoNew York.  XTURES FOR LAMPS, OIL OR ELECTRIC. neral Electric Co Schenectady, N. Y.  PRGINGS FOR CRANK, PRO- PELLER OR THRUST SHAFTS, ETC. eveland City Forge & Iron Co Cleveland.	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve CoTroy, N. Y. neeler Condenser & Engineering CoNew York.  XTURES FOR LAMPS, OIL OR ELECTRIC. neral Electric Co Schenectady, N. Y.  PRGINGS FOR CRANK, PRO- PELLER OR THRUST SHAFTS, ETC. eveland City Forge & Iron Co Cleveland.	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The
HEATERS. ss Valve Co	Watson-Stillman Co., The



#### SULLIVAN M.

DREDGING OF ALL KINDS

THE REMOVING OF DEEP WATER EARTH AND ROCK A SPECIALTY.

721 West Ferry St.

BUFFALO,

N.Y.

#### THE

# Standard Contracting Co.

**ENGINEERS AND CONTRACTORS** 

For Railroads, Dredging, Dock Build-

ing, Concrete, Submarine work, &c.

Wade Building

Cleveland, Ohio

# C. H. STARKE DREDGE & DOCK CO.,

Contractors for Public Works.

DREDGING, PILE DRIVING.

SUBMARINE PIPE LAYING.

Canal Street. West of First Avenue.

Milwaukee.

Wisconsin.

# The Toledo Fuel Co. Toledo, Ohio Steamboats supplied with West Va. and Ohio coals from docks or lighter. A. M. DONOVAN, PRES. & GEN. MGR.

# **CATALOGS** WANTED.

We are requested to inform the INDUSTRIALS of all branches that our French contemporary,
"LE MOIS SCIENTIFIQUE ET INDUSTRIEL" of 8 rue Nouvelle

at PARIS, 9°, has estab-lished an Information Branch from which particulars on any question may be obtained.

It is of great interest for all manufacturers to send regularly their "Catalogues" to "Le Mois Scientifique et Industriel" from where they will be forwarded to every one interested in the line.

Do not delay to send them and note the address is

#### LE MOIS SCIENTIFIQUE ET INDUSTRIEL 8 rue Nouvelle at Paris--9°

Ask for a specimen notice free on application.

# PICKANDS, MATHER & CO.

FUEL LIGHTERS at Buffalo, Erie, Ashtabula and Cleveland.



A Detour, Mich., a Fuel Dock equipped with shute capacity of 600 tons. Best quality Pittsburgh coal furnished at any time during Day or Night.

esession de la company de la c

Western Reserve Building,

CLEVELAND, 0.

# **New Fast Train to Columbus**

THE COLUMBUS FLYER

Via

#### FOUR ROUTE BIG

Leaves Union Station 6:15 p.m., daily except Sunday, with combination Baggage and Smoking Car, highback coaches and Pullman Buffet Parlor Cars (serving light supper enroute), Stopping at Wellington, New London, Shelby, Crestline, Galion and Delaware and arrives at Columbus 9:35 p. m. Get tickets and Pullman seats at Big 4 Ticket office, No. 532 Euclid Avenue or Union Depot.

THIS IS A VERY FAST **TPY** 

Iron and Brass Foundry in Connection

Phone, Main 785 Bell 135 W

# McLaughlin Iron Works

Engines, Boilers, Mill Machinery and General Repairing

Marine Repair Work a specialty Let us figure on yours

180 Center Street

ASHTABULA, OHIO



Generated on 20 Public Domain,

# Buyers' Directory of the Marine Trade---Continued.

IRON ORE AND PIG IRON.	OAKUM.
Bourne-Fuller CoCleveland, O. Hanna, M. A. & CoCleveland. Pickands, Mather & Co., Cleveland.	Stratford, Oakum Co
LAUNCHES—STEAM, NAPHTHA, ELECTRIC.	OILS AND LUBRICANTS. Dixon Crucible Co., Joseph
Truscott Boat Mfg. CoSt. Joseph, Mich.	Jersey City, N. J.
LIFE PRESERVERS, LIFE BOATS, BUOYS.	PACKING.  Jenkins BrosNew York.
Armstrong Cork Co Pittsburg.	Katzenstein, L. & CoNew York. Robertson, Jos. L. & Sons
Carley Life Float Co	New York. The National Metallic Packing Co
Kahnweiler's Sons, DNew York.	Oberlin, C.
Nicholson Ship Log Co., Cleveland. Walker & Sons, Thomas Birmingham, Eng.	PAINTS.  Baker, Howard H. & CoBuffalo. Upson-Walton CoCleveland.
LUBRICATING GRAPHITE. Dixon Crucible Co., Joseph	PATTERN SHOP MACHINERY. Atlantic Works, Inc Philadelphia.
Jersey City, N. J.  LUBRICATORS.	PILE DRIVING AND SUBMAR-
Lunkenheimer Co Cincinnati.	Buffalo Dredging CoBuffalo.
Martin-Barriss Co Cleveland.	Dunbar & Sullivan Dredging Co  Buffalo. Great Lakes Dredge & Dock Co
MACHINISTS. Chase Machine CoCleveland.	Hickler Bros. Sault Ste. Marie, Mich.
Hickler Bros., Sault Ste. Marie, Mich. Lockwood Mfg. Co	Hubbell Co., H. WSaginaw, Mich. Parker Bros. Co., LtdDetroit.
McLaughlin Iron Works, Ashtabula, O. Superior Iron Works. Superior, Wis.	Starke Dredge & Dock Co., C. H
MACHINE TOOLS (WOOD WORKING).	
Atlantic Works, IncPhiladelphia.	PIPE, WROUGHT IRON. Bourne-Fuller CoCleveland, O.
MARINE RAILWAYS	
Hickler Bros., Sault Ste. Marie, Mich.	PLANING MILL MACHINERY. Atlantic Works, IncPhiladelphia.
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF,	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL,
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF,  Crandall & Son, H. I East Boston, Mass.	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O.
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS.
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I East Boston, Mass.  MARINE TORCHES. Marine Torch CoBaltimore.  MATTRESSES, CUSHIONS,	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I East Boston, Mass.  MARINE TORCHES. Marine Torch CoBaltimore.  MATTRESSES, CUSHIONS, BEDDING. Fogg, M. WNew York	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS. American Ship Building Co
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building Co
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building CoCleveland.  Atlantic Works East Boston, Mass. Cramp, Wm. & Sons. Philadelphia. Detroit Ship Building CoDetroit. Fore River Shipbuilding Co
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I East Boston, Mass.  MARINE TORCHES. Marine Torch CoBaltimore.  MATTRESSES, CUSHIONS, BEDDING. Fogg, M. WNew York  MECHANICAL DRAFT FOR BOILERS.  American Blower CoDetroit. American Ship Building Co	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building CoCleveland.  Atlantic Works East Boston, Mass. Cramp, Wm. & Sons. Philadelphia. Detroit Ship Building CoDetroit. Fore River Shipbuilding Co
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building CoCleveland.  Atlantic Works East Boston, Mass. Cramp, Wm. & Sons. Philadelphia. Detroit Ship Building CoDetroit. Fore River Shipbuilding Co  Guincy, Mass.  Great Lakes Engineering Works
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I East Boston, Mass.  MARINE TORCHES. Marine Torch CoBaltimore.  MATTRESSES, CUSHIONS, BEDDING. Fogg, M. WNew York  MECHANICAL DRAFT FOR BOILERS. American Blower Co.,Detroit. American Ship Building Co	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building CoCleveland.  Atlantic Works East Boston, Mass. Cramp, Wm. & SonsPhiladelphia. Detroit Ship Building CoDetroit. Fore River Shipbuilding CoQuincy, Mass. Great Lakes Engineering WorksDetroit. Hyde Windlass CoBath, Me. Lockwood Mfg. Co
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I East Boston, Mass.  MARINE TORCHES. Marine Torch CoBaltimore.  MATTRESSES, CUSHIONS, BEDDING. Fogg, M. WNew York  MECHANICAL DRAFT FOR BOILERS. American Blower CoDetroit. American Ship Building Co	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building CoCleveland.  Atlantic Works East Boston, Mass. Cramp, Wm. & Sons. Philadelphia. Detroit Ship Building CoDetroit. Fore River Shipbuilding CoDetroit. Fore River Shipbuilding CoCleveland.
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building CoCleveland.  Atlantic Works East Boston, Mass. Cramp, Wm. & Sons. Philadelphia. Detroit Ship Building CoDetroit. Fore River Shipbuilding CoQuincy, Mass. Great Lakes Engineering WorksDetroit.  Hyde Windlass CoBath, Me. Lockwood Mfg. CoDetroit.  Hyde Windlass CoBath, Me. Lockwood Mfg. Co
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building CoCleveland.  Atlantic Works East Boston, Mass. Cramp, Wm. & Sons. Philadelphia. Detroit Ship Building CoDetroit. Fore River Shipbuilding CoQuincy, Mass. Great Lakes Engineering WorksDetroit.  Hyde Windlass CoBath, Me. Lockwood Mfg. Co
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building CoCleveland.  Atlantic Works East Boston, Mass. Cramp, Wm. & SonsPhiladelphia. Detroit Ship Building CoDetroit. Fore River Shipbuilding CoQuincy, Mass.  Great Lakes Engineering WorksDetroit.  Hyde Windlass CoBath, Me. Lockwood Mfg. CoMilwaukee.  Newport News Ship Building CoMilwaukee. Newport News Ship Building Co
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building CoCleveland.  Atlantic Works East Boston, Mass. Cramp, Wm. & Sons. Philadelphia. Detroit Ship Building CoDetroit. Fore River Shipbuilding CoQuincy, Mass. Great Lakes Engineering WorksDetroit.  Hyde Windlass CoBath, Me. Lockwood Mfg. CoDetroit.  Hyde Windlass CoBath, Me. Lockwood Mfg. CoMilwaukee.  Newport News Ship Building CoMilwaukee.  Newport News Ship Building CoMilwaukee.  Newport News Ship Building Co
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building Co
Hickler Bros., Sault Ste. Marie, Mich.  MARINE RAILWAYS, BUILD- ERS OF, Crandall & Son, H. I	Atlantic Works, IncPhiladelphia.  PLATES—SHIP, STRUCTURAL, ETC.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.  PRESSURE REGULATORS. Ross Valve CoTroy, N. Y.  PROPELLER WHEELS.  American Ship Building CoCleveland.  Atlantic Works East Boston, Mass. Cramp, Wm. & Sons Philadelphia. Detroit Ship Building CoDetroit. Fore River Shipbuilding CoQuincy, Mass. Great Lakes Engineering WorksDetroit.  Hyde Windlass CoBath, Me. Lockwood Mfg. CoMilwaukee.  Newport News Ship Building CoMilwaukee. Newport News Ship Building CoNew York. Sheriffs Mfg. CoMilwaukee. Superior Ship Building CoNew York. Sheriffs Mfg. CoMilwaukee. Superior Ship Building Co

PUMPS FOR VARIOUS PURPOSES.  Great Lakes Engineering Works
Roelker, H. BNew York.  REGISTER FOR CLASSIFICATION OF VESSELS.
Great Lakes RegisterCleveland.  RIVETS. STEEL FOR SHIPS
AND BOILERS.  Bourne-Fuller CoCleveland, O. Great Lakes Engineering Works Detroit.
SAFETY VALVES.  Lunkenheimer CoCincinnati.  SAIL MAKERS.
Baker, Howard H. & CoBuffalo. Upson-Walton CoCleveland.
SALVAGE COMPANIES. See Wrecking Companies. SEARCH LIGHTS.
General Electric Co
See Punches, and Shears.  SHIP AND BOILER PLATES
AND SHAPES.  Bourne-Fuller CoCleveland, O. Otis Steel CoCleveland.
SHIP BUILDERS.  American Ship Building Co  Cleveland.
Atlantic Works East Boston, Mass. Buffalo Dry Dock Co Buffalo. Collingwood Shipbuilding Co., Collingwood, Ont. Cramp, Wm. & Sons. Philadelphia.
Chicago Ship Building CoChicago.  Detroit Ship Building CoDetroit  Fore River Ship Building Co
Great Lakes Engineering Works  Lockwood Mfg. Co  East Boston, Mass.
Sparrow's Point, Md.
New York Ship Building Co
Roach's Ship YardChester, Pa. Shipowner's Dry Dock CoChicago. Toledo Ship Building CoToledo.
SHIP CHANDLERS.  Baker, Howard H. & CoBuffalo.  Marine Mfg. & Supply Co  New York  Upson-Walton CoCleveland.
SHIP DESIGNERS. Kidd, Joseph



SHIP FLOORING.

Clemente, The C., Co....Cleveland.

# Charts for Sailormen

We carry in stock a complete line of mariners' charts covering nearly every waterway on the globe. They are bound (backed if desired) in pure linen and practically indestructible. Printed in colors. Mailed anywhere on earth

Here is the list of charts for the Great Lakes. Glance them over and see if you need any of them.

#### NAMES OF CHARTS

#### LAKE ONTARIO

Lake Ontario
St. Lawrence River Nos. 1, 2, 3 4, 5, 6
Coast-Charts Nos. 1, 2, 3, 4, 5
Oswego Harbor
Little Sodus Bay
Great Sodus Bay
Charlotte Harbor
Niagara Falls

#### LAKE ERIE

Lake Erie Coast-Charts Nos. 1, 2, 3, 4, 5, 6, 7 **Detroit River** Lake St. Clair St. Clair River Buffalo Harbor and Niagara River **Dunkirk Harbor** Erie Harbor and Presque Isle Conneaut Harbor Ashtabula Harbor Fairport Harbor Cleveland Harbor Lorain Harbor Huron Harbor Sandusky Bay Maumee Bay and Maumee River

#### LAKE HURON

Lake Huron and Georgian Bay
South End of Lake Huron
Saginaw Bay
Straits of Mackinac
Coast-Charts Nos. 5, 6, 7, 8
Sand Beach Harbor of Refuge
Saginaw River
Tawas Harbor
Thunder Bay
Presque Isle and Middle Island
St. Marys River Nos. 1, 2, 3
St. Joseph Channel and Western End
of North Channel

#### LAKE MICHIGAN

Lake Michigan
North End of Lake Michigan

South End of Lake Michigan Beaver Island Group Grand and Little Traverse Bays Coast-Charts Nos. 1, 2, 3, 4, 5, 6, 7, 8, 9 South End of Green Bay North End of Green Bay Manistique Harbor Charlevoix Harbor South Fox Island Shoals Manitou Passage Frankfort Harbor Manistee Harbor Ludington Harbor Muskegon Harbor Harbor at Michigan City Lake Front, Chicago Milwaukee Harbor Sheboygan Harbor Manitowoc Harbor Sturgeon Bay, Canal, and Harbor of Refuge Head of Green Bay Little Bay de Noc Portage Lake, Manistee Co.

#### LAKE SUPERIOR

Lake Superior Lake Superior Nos. 1, 2, 3 Coast-Charts Nos. 1, 6 Coast-Chart No. 8, including Isle Royal Grand Island Marquette and Presque Isle Harbors Huron Bay and Huron Islands L'Anse and Keweenaw Bay Portage Lake and River Copper Harbor Agate Harbor Eagle Harbor Eagle River Ontonagon Harbor Apostle Islands Nos. 1, 2 Duluth and Superior Harbor Agate and Burlington Bays (Two Harbors)

Write to the

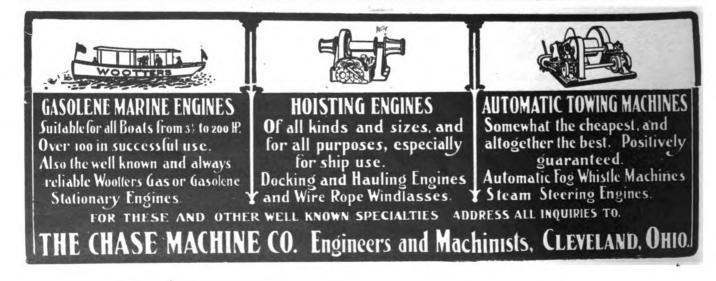
#### **BOOK DEPARTMENT**

The Penton Publishing Company
Cleveland



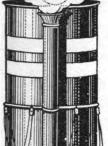
#### Buyers' Directory of the Marine Trade---Continuea.

SHIP LANTERNS AND LAMPS. Upson-Walton Co	SURVEYORS, MARINE—Continued. Steel, Adam	VESSELS AND FREIGHT AGENTS—Con. Hawgood & Co., W. A Cleveland. Holmes, Samuel New York Hutchinson & Co Cleveland. McCarthy, T. R Montreal. Mitchell & Co Cleveland. Parker Bros. Co., Ltd Detroit. Prindiville & Co Chicago. Richardson, W. C Cleveland. Sullivan, D. & Co Chicago. WATER GAUGES. Lunkenheimer Co Cincinnati, O. WHISTLES, STEAM. Lunkenheimer Co Cincinnati.
Cuyahoga Falls, O.  STEAM VESSELS FOR SALE.  Holmes, SamuelNew York.	TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS. Watson-Stillman CoNew York.	WILFORD'S WATERPROOF CLOTH. Bunker, E. A New York
McCarthy, T. R Montreal, Can.  STEAMSHIP LINES, PASS, AND FREIGHT.  American Line New York.	TOOLS, WOOD WORKING. Atlantic Works, IncPhiladelphia.  TOWING MACHINES.	WIRE ROPE AND WIRE ROPE FITTINGS. Baker, H. H. & CoBuffalo. Upson-Walton CoCleveland.
Boston SteamshipBoston. C. & B. Transit CoCleveland. International Mercantile Marine CoPhiladelphia.	American Ship Windlass Co	WINDLASSES.  American Ship Windlass Co Providence, R. I.  American Ship Building Co
Mallory Line	Donnelly Salvage & Wrecking Co	Dake Engine Co
Ward Line	Boston & Lockport Block Co Boston.	Marine Mfg. & Supply Co New York WINCHES.
STEEL CASTINGS. Otis Steel CoCleveland. STEERING APPARATUS.	TUBING, SEAMLESS. Shelby Steel Tube CoPittsburg, Pa. VALVES, STEAM SPECIALTIES,	American Ship Windlass Co Providence, R. I. Hyde Windlass Co Bath, Me.
American Ship Building Co	Jenkins Bros	WOOD WORKING MACHINERY Atlantic Works, IncPhiladelphia
Detroit Ship Building Co Detroit. Hyde Windlass Co Bath, Me. Marine Mfg. & Supply Co New York. Sheriffs Mfg. Co Wilwaukee.	VALVES FOR WATER AND GAS. Ashton Valve CoBoston. Lunkenheimer CoCincinnati. Ross Valve CoTroy, N. Y. Scoville Check Valve Co Ashtabula, O.	WRECKING AND SALVAGE COMPANIES.  Donnelly Salvage & Wrecking Co Kingston, Ont. Great Lakes Towing CoCleveland. Parker Bros. Co., LtdDetroit.
SUBMARINE DIVING APPARATUS.  Morse & Son, A. JBoston. Schrader's Son, Inc. A New York.	VESSEL AND FREIGHT AGENTS. Billett, T. R	YACHT AND BOAT BUILDERS. Drein, Thos. & Son
SURVEYORS, MARINE.  Hynd, AlexanderCleveland.  Parker Bros. Co., LtdDetroit.  Nacey, JamesCleveland.	Douglas, G. L. Jr	YAWLS. Drein, Thos. & Son









Dixon's Flake Graphite unlike oil does not injure boilers; in fact, it is an excellent preventive of corrosion. 12 pages in our new edition of "Graphite as a Lubricant' treat of marine lubrication. Get copy 77-C for yourself.

Joseph Dixon Crucible Co. Jersey City, N. J.

# 2

The Braender Bilge Syphon Always on Watch

#### The BRAENDER AUTOMATIC BILGE SYPHON

when once set in place, will, without any care or attention, do its work with intelligence and promptness, as it does not waste steam when not in operation, and begins to work upon the least accumulation of water in the hold. It is simple in construction, automatic in its nature, not liable to get out of order, made of the best steam metal, and is guaranteed to keep the hold of a vessel properly dry, and do all that is claimed for it.

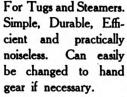
This outomotic device has received commendation from all leading engineers throughout the country. Its simplicity of construction, durability, and entire freedom from possible disarrangement, together with its pronounced success in removing large quantities of water at a nominal cost of operation, has won for it the approval of ship-owners and seamen everywhere. With all these advantages, its moderate cost places it within the reach of every one. By giving the BRAENDER BILGE SYPHON a trial you will be convinced that it does everything we claim for it.

PHILIP BRAENDER

143 West 125th Street,

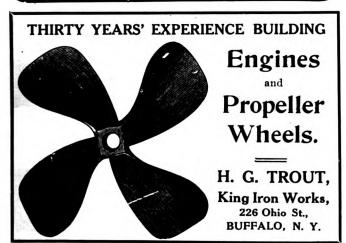
#### ESTABLISHED, 1854. MANUFACTURING CO. Manufacturers of **PROPELLER** W WHEELS Marine Engines and Repairs. Milwaukee, Wis. Phone 8. 163

# Dake Pilot House Steam Steerer



DAKE ENGINE CO..

Grand Haven, Mich.





Salvage Submarine General Construction. Illumination. Send for Sample. Agents wanted.

Patentees and Manufacturers

#### **MARINE** TORCH CO. THE BALTIMORE, MD.

Especially approved by The British Board of Trade, either of Life Buoy Lights or Deck Flare.



# Aids to Navigation

are of vital importance to vessel interests.

# SCHERZER ROLLING LIFT BRIDGES

aid navigation and meet with the approval of all vessel interests, because of the wide and unobstruc-ted channel provided for navigation, enabling vessels to pass easily and rapidly through the draw.

# The Scherzer Rolling Lift Bridge Co.

Main Offices: 1616 Monadnock Block, CHICAGO, U. S. A.

Generated on 20 Public Domain,

#### VESSEL AND INSURANCE AGENTS.

FRED P. BELCHER, Vessel and Insurance Agent, 430 Grain Exchange, WINNIPEG, MAN. P. O. Box 230.

#### T. R. BILLETT,

Vessel Agent

811 Union Bank Building, WINNIPEG.

#### JOHN J. BOLAND & CO.,

Vessel and Insurance Agents. 800-804 Prudential Bldg. Both Phones. BUFFALO, N. Y.

#### G. L. DOUGLASS, JR., Vessel Agent. DULUTH, MINN.

Sell 878 Zenith 14. Bell 561. Telephones: Office Residence.

C. W. ELPHICKE & CO.

Vessel and Insurance Agents. No. 6 Sherman St. CHICAGO, ILL. Telephone, Harrison 1194.

#### JOHN B. HALL, Vessel Agent.

17 Exchange Bldg., 202 Main St., Telephone, Seneca 892. BUFFALO, N. Y.

#### W. A. Hawgood. Arthur H. Hawgood. W. A. HAWGOOD & CO.

Vessel and Insurance Agents. 220-21 Perry-Payne Bldg., Cleveland, O. Office, Main 2395.
Telephones: Res. W. A. Hawgood, Doan 84-J. Res. A. H. Hawgood, Doan 841-J.

#### D. T. HELM & CO.

Vessel and Insurance Agents. Telephones—Office 263.
—Res. 381-3.

DULUTH, -- - - MINN.

#### SAMUEL HOLMES,

Steamship Offices, For Selling, Chartering and Building all Classes Steam Vessels. Steam Vessel Circulars Weekly Freight Circulars. Morris Bldg.,66-8 Broad St., New York.

#### 1906 Nautical Almanacs PRICE 50c

Order from THE MARINE REVIEW

#### VESSEL AND INSURANCE AGENTS.

C. L. Hutchinson. W. H. McGean HUTCHINSON & CO. Vessel and Insurance Agents.

Office, Main 2453.

Phones: Res. C. L. Hutchinson, Lake 244.
Res. W. H. McGean, Doan 274. 1408 Rockefeller Bldg. Cleveland.

#### FRANK MAYTHAM.

Attorney and Counsellor at Law Proctor in Admiralty.

10 Marine Exchange Bldg., BUFFALO, N. Y.

#### T. R. McCARTHY,

Steamship and Freight Broker.

Chartering, Forwarding and General Commission Agent; and Broker for the Sale, Purchase and Construction of Steamers and Sailing Vessels.

Cable Address, "Macarthy, Montreal."
(Watkins', Scott's Liebers and A. B. C. Codes Used.)

Shipping Agent to The Asbestos & Asbestic Co., I.td., of Asbestos Que. The Belgo Canadian Pulp & Paper Co., Ltd., of Shawinigan Falls, Que. Edward Lloyd, Ltd. Paper Manufacturer, of London (Eng.). 404 Board of Trade Bldg., MONTREAL, CAN. Correspondence Invited and Agencies Solicited.

#### J. Mitchell. J. F. Wedow. A. Mitchell. MITCHELL & CO.

Vessel and Insurance Agents 1504-6-8 Rockefeller Bldg., Cleveland, O. Office Tel. M. 767. Res. John Mitchell, Doan 341. John F. Wedow, Doan 141-J. Alfred Mitchell, Doan 218.

#### PARKER BROS. CO., LTD.,

Vessel, Marine Insurance and Wrecking Agents. Marine Surveyors. Office Tel. Main 5314. Night: Main 290 Night: Grand 1723 J. 15 Atwater St. West, Detroit, Mich.

#### W. C. RICHARDSON,

Vessel Owner and Broker and Marine Insurance Agent. 420-421 Perry Payne Building, CLEVELAND, O. Office Tel. 338. Residence Tel. 2938.

#### D. Sullivan.

F. J. Sullivan. D. SULLIVAN & CO.

> Vessel Agents. . Marine Insurance.

2-4 Sherman St., CHICAGO, ILL. Office Tel., Harrison 2847. Res. Ashland 2483.

#### VANCE & JOYS CO. Vessel and Insurance Agents

No. 21 NEW INSURANCE BUILDING, TELEPHONE MAIN 99. MILWAUKEE, WIS.

#### MARINE INSURANCE,

WILLIAM GOW. Price, \$1.50. THE PENTON PUB. Co., Cleveland, O.

#### PROCTORS IN ADMIRALTY.

ALBERT J. GILCHRIST,

Proctor in Admiralty. Rockefeller Building, CLEVELAND, O.

#### GOULDER, HOLDING & MASTEN,

Law Offices.

H. D. Goulder. S. H. Holding. F. S. Masten. Perry-Payne Building, CLEVELAND, O

#### HOYT, DUSTIN & KELLEY,

Lawyers and Proctors in Admiralty. Offices, 702 Western Reserve Bldg., CLEVELAND, O.

#### JENKINS, RUSSELL & EICHELBERGER,

Attorneys-at-Law and Proctors in Admiralty. 1520 Rockefeller Bldg. CLEVELAND.

#### C. E. KREMER,

Counselor at Law and Proctor in Admiralty. Suite 1505-1506-1507 Fort Dearborn Blig., CHICAGO, ILL.

#### RAY G. MACDONALD,

Attorney-at-Law and Proctor in Admiralty. 1018 Hartford Building, Telephone, Central 2484 CHICAGO, ILL.

#### SHAW, WARREN, CADY & OAKES,

Attorneys-at-Law. and Proctors in Admiralty. Union Trust Bldg., Detroit, Mich.

#### WHITE, JOHNSON, McCASLIN & CANNON.

Attorneys-at-Law and Proctors in Admiralty. Williamson Bldg., CLEVELAND, O.

#### NAVAL ARCHITECTURE,

bу THOS. H. WATSON.

A manual on laying off iron and steel vessels. Valuable for naval architects as well as beginners in ship yards.

Price, \$5.00.

Order from THE PENTON PUB. Co., Cleveland, O.



# http://www.hathitrust.org/access 2024-08-27 23:31 GMT , Google-digitized

0

PROFESSIONAL.

#### PROFESSIONAL

PROFESSIONAL.

#### ROBERT W. HUNT & CO.,

Bureau of Inspection. Tests and Consultation.

1121 The Rookery, CHICAGO. Monong. Bank Bldg., PITTSBURG. 66 Broadway, NEW YORK.

Inspectors of shipbuilding material and machinery. Inspectors of all materials. Duty tests of engines and boilers. Physical and chemical laboratories.

#### James Nacey. Alexander Hynd. NACEY & HYND.

Marine Architects.
Mechanical Draughtsmen.
Consulting Engineers.

Specifications and designs for all descriptions of marine vessels, engines and boilers. Supervision of construction and repairs. Damage and other surveys carefully attended to.

Agents for Marine Specialties.

208-9 Western Reserve Building, CLEVELAND, O.

Phone, Main 3339 J.

#### W. J. WOOD,

Naval Architect, Consulting Engineer.

Prepares designs or working drawings and specifications for all classes of vessels and superintends construction and repairs. Surveys damaged property and estimates cost of repairs. Arbitrator and court expert.

FIRE BOATS A SPECIALTY.

Complete Plans furnished for Steel, Composite or Wooden Vessels.

543 Postal Telegraph Bldg. Tel. Harrison 1020. CHICAGO.

#### JOSEPH KIDD,

Marine Architect and Surveyor. Consulting Ship Builder and Engineer

Over thirty years' experience. Specifica-tions, designs and estimates. Superintend-ence of construction and repairs. Damage and other surveys carefully attended to Negotiations for the building, charter or sale of all kinds of vessels and machinery.

610 Board of Trade. DULUTH, MINN.

HAND BOOK ADMIRALTY LAW,

ROBT. M. HUGHES, Price \$3.75.
THE PENTON PUB. Co., Cleveland, O.

#### ROBERT CURR.

Naval Architect and Surveyor.

Specifications and Designs furnished for all types of vessels. Supervision of Construction and Repairs. Damage and other surveys carefully attended to. Piece work price lists and cost of labor a speciality. 1024 Rockefeller Bldg., CLEVELAND, OHIO

JUST PUBLISHED CLASS BOOK OF NAVAL ARCHITECTURE

Illustrated BY W. J. LOVETT Price \$2.50 Order from Marine Review, Cleveland.

NAVAL ARCHITECTS' AND ENGINEERS' DATA BOOK,

By T. H. WATSON. Price, \$1.50. The Penton Pub. Co., Cleveland, O.

Weekly.

Illustrated.

Price 6d.

# "The Shipping World"

Written by Experts.

Illustrated by Artists.

DEVOTED TO THE INTERESTS OF A SHIP AND HER CARGO

#### SPECIAL FEATURES:

Current Events, by the Editor.

Special Articles on TRADE, COMMERCE, SUBVENTIONS, and all SHIPPING QUESTIONS.

Shipping in Parliament.

Shipping and the Law.

Ship Sales and Contracts.

Neptune's Mail, with exclusive News and Notes.

Notes by a Naval Architect, written by Practical Scholars. Reports on Freight and Marine Insurance.

Trade and Finance.

Board of Trade Notes.

Reviews.

Prices Current.

Launches and Trial Trips.

Orders for subscription to "The Shipping World" are r ceived at the office of the MARINE REVIEW.

ANNUAL SUBSCRIPTION:

United Kingdom, 21s. Foreign Countries, 28s.

THE "SHIPPING WORLD," LTD., EFFINGHAM HOUSE, ARUNDEL STREET, STRAND, LONDON, W. C.

WRITE US FOR ANY BOOK ON MECHANICAL SUBJECTS. The Penton Publishing Co. Cleveland.

# Prindiville & Company

AVERAGE ADJUSTERS INSURANCE BROKERS

234 La Salle St.

Chicago, III.

Representing Johnson & Higgins New York

Foreign Representatives Willis Faber & Co., Ltd., London. John D. Tyson & Co., Liverpool.







# WARD LINE

THE NEW YORK & CUBA MAIL STEAMSHIP CO.

POPULAR ROUTE TO

#### CUBA, NASSAU, MEXICO

FINEST AND LARGEST STEAMSHIPS SAILING FROM NEW YORK TO OTHER THAN EUROPEAN PORTS. HOLDERS OF THE RECORD BETWEEN HAVANA AND NEW YORK -- 1,240 MILES IN 61

FOUR SAILINGS EACH WEEK BETWEEN NEW YORK and HAVANA.

WEEKLY SERVICE TO GUANTANAMO, SANTIAGO, MANZANILLO AND CIENFUEGOS, CUBA, PROGRESO, VERA CRUZ AND TAMPICO, MEXICO.

SEMI-MONTHLY SAILINGS TO

Nassau, N. P. Bahamas.

LOW RATES OF FREIGHT AND PASSAGE.

SEND FOR OUR SCHEDULES, RATES AND DESCRIPTIVE MATTER.

James E. Ward & Co.

GENERAL AGENTS

90 Wall Street, NEW YORK.

#### "MALLORY LINE"

(New York 2 Texas Steamship Company)

Steamers Leave Piers New 15, 16 East River, NEW YORK

FOF GALVESTON, TEXAS

Every WEDNESDAY and SATURDAY, taking FREIGHT for all Points in
TEXAS, MEXICO, NEW MEXICO, ARIZONA, UTAH, KANSAS, OKLAHOMA, MISSOURI, COLORADO and CALIFORNIA.

Saturday's Steamer touches at Key West, Fla.

Saturday's Steamer touches at Key West, Fla.

FOF MOBILE, ALA.

A Steamer sails every FRIDAY, 3p. m., taking FREIGHT for ALABAMA, MISSISSIPPI, MISSOURI and the SOUTHWEST.

FOF BRUNSWICK, GA.

A Steamer sails every FRIDAY, 3p. m., taking FREIGHT for all Points in GEORGIA, FLORIDA, ALABAMA, LOUISIANA and the SOUTH and SOUTHWEST.

PASSENGER DEPARTMENT

Six days Ocean royage to GALVESTON, Teras, thence by rail to All points Southwest. Six days to MOBILE Ala., through tickets to NEW ORLEANS. 65 hours to BRUNSWIOK, Ga., thence rail to Interior Southesstern Points.

An especially attractive route through famous "SEA ISLANDS" to JACKSONVILLE, Florida.

Through Bill of Lading. Insurance at lewest raise.

Through Bill of Lading. Insurance at lowest rates.

C. H. MALLORY & CO., General Agents, Branch Office, 385 Broadway, New York. 129 Front Street



#### THE CLEVELAND & BUFFALO

TRANSIT COMPANY

UNPARALLELED NIGHT SERVICE The Twin Flyers of The Lakes "CITY OF BUFFALO" "CITY OF ERIE"

Both together being, without doubt, in all respects the finest and fastest that are run in the interest of the traveling public in the United States

TIME CARD.—DAILY INCLUDING SUNDAY, CENTRAL STANDARD TIME, Leave CLEVELAND 8 p. m. Arrive BUFFALO 6:30 a. m.

"BUFFALO 8 p. m. "CLEVELAND 6:30 a. m. "BUFFALO & p. m. "CLEVELAND 6:30 a. m. Connections made at Buffalo for all Eastern and Canadian points; at Cleveland for Toledo, Detroit and all points West and Southwest. Tickets reading over L. S. & M. S. Ry. will be accepted on this Company's Steamers without extra charge. Special Low Rates Cleveland to Buffalo and Niagara Falls every Saturday Night, also Buffalo to Cleveland. Ask Ticket Agents for tickets via C. & B. Line. Send four cents for illustrated pamphlet.

W. F. HERMAN, G. P. A., Cleveland, O.

# AMERICAN LINE CHERBOURG SOUTHAMPTON

Sailing From New York Every Saturday at 9 30 a. m

(11.629 tons) New York (10,798 tons)

St. Paul (11.629 tons) Philadelphia

Special Express Train from Plymouth and Southampton to London and between Cherbourg and Paris.

# RED STAR LINE NEW YORK

LONDON PARIS

CALLING AT DOVER FOR LONDON AND PARIS. Sailing Wednesday from Pier 14, North River, N. Y.

Finland (12,760 tons) Kronland

Vaderland

Zeeland

(12.017 tons)
One of the Shortest Routes to LONDON, PARIS, BELGIUM, HOLLAND, GERMANI, THE RHIME, SWITZERLAND and ITALY.

9 Broadway, New York.

1319 Walnut St., Philadelphia.
India Building, 34 State St., Boston.
1306 F St., N. W., Washington, D. C.
219 St. Charles St., New Orleans.
90-96 Dearborn St., Chicago.
900 Locust St., St. Louis.
121 South Third St., Minneanolis.
207 Monadnock Bidg., San Francisco.
9 East Sixth St. St. Paul.
41 King St., East Torento.

PIERS: 14 & 15 NORTH

RIVER, FOOT OF FUL-

TON ST., NEW YORK.

# **BOSTON STEAMSHIP CO.**

Japan, South China and Manila Steamship Line Operated in connection with the

Northern Pacific and Great Northern Railway Companies.

Monthly Passenger and Freight Service from Tacoma and Seattle, Washington.

New Twin-screw American Steamships of 10,000 tons register. Exceptionally large staterooms, all outside.

OWING TO THE GREAT SIZE OF THE SHIPS, AND THE IMMENSE CARGOES CARRIED IT HAS NEVER BEEN NECESSARY TO USE RACKS ON THE DINING TABLES.

Rates at any office of

NORTHERN PACIFIC RAILWAY, GREAT NORTHERN RAILWAY, CHICAGO, BURLINGTON & QUINCY RAILWAY, THOMAS COOK & SONS, Tourists Agents.

A. WINSOR, PRES. Boston, Mass.

F. WATERHOUSE, AGENT, Seattle, Wash.

Digitized by Google

#### ALPHABETICAL INDEX OF ADVERTISERS IN THE MARINE REVIEW.

The star (\*) indicates that the advertisement appears alternate weeks. For addresses see a lvertisements on page noted. The dagger (†) indicates that advertisement appears once a month.

	• • •			
Almy Water Tube Boiler Co 37	Donnelly Salvage & Wrecking Co. 49	*Lake Erie Boiler Compound Co	Red Star Line	10
	Douglas, G. L. Jr 46		Richardson W. C	ie
American Injector Co	Drein, Thos., & Son 49	*LeMois Scientifique et Industrial 41	*Ritchie, E. S., & Sons.	27
American Line 48	Dunbar & Sullivan Dredging Co. 39	Lockwood Mfg. Co 50	Roberts Safety Water-Tube	•
American Ship Building Co 4	Dunion of Samuel Developing Co. Co.	Lunkenheimer Co	Boiler Co	
American Ship Windlass Co 2	Elphicke, C. W. & Co 46		†Robertson, Jas. L. & Sons	
*Armstrong Manufacturing Co 10			Roelker, H. B	_
Armstrong, A. E., Mfg. Co 13	Erle Railroad 50	36	Ross Valve Co	×
Armstrong Cork Co		Maytham, Frank 46	Code vario Co	w
tAnhton Valve Co	Falls Hollow Staybolt Co 37	McCarthy, T. R	Safety Car Heating & Lighting Co	5
Atlantic Mutual Ins. Co 9	Fix's, 8, Sons 50	McCurdy. Geo. L 85	Scherzer Rolling Lift Bridge Co	15
Atlantic Works	Fletcher, W. & A., Co	MCCMRRITH TLOU MOLES 31	Schrader's, A., Son, Inc	Ю
Atlantic Works. Inc	Fore River Ship Building Co 49	MacDonald, Ray G 46	Scoville Check Valve Co	-
TAMBLUC WOFES. ILC	Fore River Ship Building Co 49	Mallory Line 48	Shaw, Warren, Cady & Oakes	16
Baker, Howard H. & Co 52	Furstenau, M. C 47	- marine from Co., Day City, Mich. —	*Shelby Steel Tube Co	9
Belcher, Fred P 46		*Marine Mfg. & Supply Co 38	Sheriffs Mfg Co	15
Big Four Rv 41	General Electric Co 52	Marine Torch Co , The 45	Shipping World Year Book	17
Billett, T. R 46	Gilchrist, Albert J 46	Martin-Barriss Co 49	†Shipowners' Dry Dock Co	_
Boland, J. J 46	†Goldschmidt Thermit Co	Maryland Steel Co 12	Siggers & Siggers	47
*Boston & Lockport Block Co 10	Goulder, Holding & Masten 48	Milwaukee Dry Dock Co 5	Smith, Stanley B., Coal & Dock Co.	3
Boston Steamship Co 48	Gould's Nautical School 36	Mitchell & Co 46	Smooth-On Mfg. Co	51
*Bourne-Fuller Co	Great Lakes Dredge & Dock Co 1	Morse, A. J., & Son 47	Standard Contracting Co	41
Bowers, L. M. & Co 52	Great Lakes Engineering Works. 14	Mosher Water Tube Boiler Co 37	Starke, C. H Dredge & Dock Co.	ii
Braender, Philip	Great Lakes Register 9		†State Manufacturing Co	
Breymann, G. H., & Bros 39	*Great Lakes Towing Co 36		Stratford, Geo., Oakum Co	43
Briggs, Marvin 36		Nacey & Hynd 47	†Submarine Signal Company	
†Brown Hoisting Machinery Co —	Hall, John B 46	National Metallic Packing Co 13	Sullivan, M	41
Buffalo Dredging Co39	Hanna, M. A., & Co 39	Newport News Ship Building &	Sullivan & Co	ià
Buffalo Dry Dock Co 5	Hawgood, W. A. & Co 46		*Superior Iron Works.	
Bunker, Edw. A	Helm, D. T., & Co	New York & Cuba Mail S. S. Co 48	Superior Ship Building Co	4
	Hickler Bros	New York Shipbuilding Co 7		
	Holmes, Samuel 46		Taylor Water-Tube Boiler Co :	37
ChaseMachine Co 44	Hoyt, Dustin & Kelley 46	Northwestern Steam Boiler &	Tietjen & Lang Dry Dock Co	ś'n
	Hubbell, H. W., Co 39	1 344 0 00	Toledo Fuel Co	41
Chicago Ship Building Co 4	Hunt, Robert W., & Co 47	mig. Co	Toledo Ship Building Co	5
Clement, The C., Co	Hutchinson & Co 46		Trout, H. G	45
Cleveland City Forge & Iron Co . 51	Hyde Windlass Co		Truscott Boat Mfg. Co	2
*Collingwood Shipbuilding Co 9	International Mercantile Marine	Otis Steel Co 13	Upson-Walton Co	-
Continental Iron Works 2	international mercantile marine			
Cory, Chas. & Son 50	Co 48		Vance & Joys Co	16
Cramp, Wm. & Sons, S. & E. B. Co. 8	7 - 1 - 7 - 13	Parker Bros. Co	Walker, Thomas, & Son	9
C & B. Transit Co 48	Jenkins Brothers	Peck, Chas. E. & W. F 9	Ward Line	4ã
Curr, Robert 47	Jenkins, Russell & Eichelberger 46	Penberthy Injector Co	*Watson-Stillman Co	51
5. 7. 6	m, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Pickands, Mather & Co 41	†Wheeler Condenser & Engineer-	
Dake Engine Co	Kahnweiler's Sons. David 51	Pittsburg Coal Co 3	ing Co	
Dearborn Drug & Chemical Wks. 3	Katzenstein L., & Co	Prindiville & Company 47	†Williams, G. H., Co.	_
Delaware River Iron S. B. & E.	Kidd, Joseph 47	Limited and company	White. Johnson, McCaslin &	_
Works 51	Kingsford Foundry & Machine		Cannon	40
Detroit Ship Building Co 4	Works 87	Outstand Inco Works Co. 50	Wood, W. J.	47
Dizon, Joseph, Crucible Co 45	K.remer, C. E 46	Quintard Iron Works Co 50	**************************************	=+
		l	l	
				_

Sawdolet (made of wood fiber, and mineral substances) can be applied to steel decks cheaply. It is fire proof, water proof, dust proof, and vermin CHIP proof. Can be colored any tint and is practically indestructible and monolithic. Samples submitted and estimates furnished.

The C. Clemente Company

1722 Oreson Ave. CLEVELAND

#### FORE RIVER SHIPBUILDING CO.

QUINCY, MASSACHUSETTS SHIP and ENGINE BUILDERS **CURTIS MARINE TURBINES** HIGH GRADE STEEL FORGINGS

#### W. & A. FLETCHER CO.

NORTH RIVER IRON WORKS

#### PARSONS MARINE TURBINES

Contractors for Vessels Complete. Marine Engines, Boilers and Machinery of all kinds

**Enlarged Pacifities** 

HOBOKEN, N. J.

#### The Atlantic Works, Massachusetts. EAST BOSTON, BUILDERS OF

Steamships, Steam Yachts, Tow Boats, Etc.

Marine Engines, Boilers and Tanks. Heavy Machinery and Plate Iron Work. THREE MARINE RAILWAYS.

# The Martin-Barriss Co.

654 Seneca Street CLEVELAND, OHIO

IMPORTERS AND MANUFACTURERS OF

#### MAHOGANY WHITE MAHOGANY

and all Native Cabinet Woods

High Grades of Kiln Dried Woods for Cabin Work and Inside Trim WHITE OAK TIMBERS AND PLANK Constantly on Hand and Sawed to Order on Short Notice



METALLIC LIFE BOATS AND RAFTS, YACHTS AND PLEASURE BOATS LIFE PRESERVERS

Outfit for Lake Steamers a specialty.

THOMAS DREIN & SON, Builders, Tetnell St. below Railroad WILMINGTON DEL

John Donnelly, Sr., Pres. H. B. Folger, Trees.

John Donnelly, Jr., Vice-Pres. Thos. Donnelly, Secy.

THE

#### DONNELLY SALVAGE & WRECKING CO., LTD. KINGSTON, ONT.

DIVERS, STEAM PUMPS, TUGS, ETC. SUPPLIED ON SHORTEST NOTICE.



# Chas. Cory & Son

Manufacturers of

Mechanical and Electrical Telegraphs and Indicators. Engine Bells and Electric Call Bells.

286 Spring St., near Hudson, NEW YORK CITY.

# QUINTARD IRON WORKS CO. MARINE TURBINES

ENGINES, BOILERS AND MACHINERY **NEW YORK** Office 742 E. 12th St..

#### Tietjen & Lang Dry Dock Co. HOBOKEN, N. J.

EIGHT DRY DOCKS 600, 800, 1,000, 1,200, 1,400, 1,800, 2,000, 10,000 TONS General Repairs on Wooden and Iron Vessels FT. OF 17th STREET

Telephone 700 Hoboken

HOBOKEN, N. J.

# Going to Pittsburg

- 1 The Eric Railroad is the only road that sterilizes and purifies, through a process invented by its own chemist, its Passenger coaches, Parlor cars, Cafe cars, Dining cars and Sleepers, a very essential safe-guard to its patrons, for it kills all poisonous germs and makes traveling in such sterilized cars absolutely safe in preventing disease infection.
- 2 The Erie Railroad has the largest passenger locomotives in the world—only eleven words but they mean a good deal.
- 3 The Erie Railroad has built and uses a steel Baggage car—something new on steam roads.
- 4 The Erie Railroad is the road that runs every day (not every day except Sunday, but every day). Seven fine passenger trains from Cleveland to Pittsburg and seven from Pittsburg to Cleveland—that's fourteen fine passenger trains daily between the two
- 5 The following may surprise you The Erie Railroad—was the first railroad in the world to run sleeping cars. The Company built two cars, known by the names of "Ontario" and "Erie", remember please that this was before Pullman or Wagner Cars existed.
- 6 Patrons of the Erie Cafe Club cars Cleveland to Pittsburg have FREE use of the spacious lounging and smoking parlors of the car.

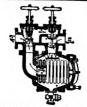
#### Water Filters, Regulators and Engines.

We make Pressure Regulating Valves for all purposes, steam or

Our Feed-Water Filter will keep oil out of your boiler.

We can interest you if you use a condenser.

Water Engines for Pumping Organs.



Keep Oil out of your Boiler with the Feed-Water Filter For Marine and Land Service. Two of these Filters are in use on the Oceanic.

# ROSS VALVE CO. TROY

The Lockwood Manufacturing Co. EAST BOSTON, MASS.

ENGINEERS AND MACHINISTS.

Builders of Steamships, Tow Boats and Marine Engines. Repairing of Hulls and Machinery.

#### Practical Marine Engineering

By PROF. W. F. DURANT

For Marine Engineers and Students, with aids for applicants for marine engineers' license.

FOR SALE BY

THE MARINE REVIEW, Cleveland

ORAM FIX

ESTABLISHED 1860

S. FIX'S SONS

SUCCESSORS TO S. FIX & SON.

Steam Flue Welding Works

Our work stands government test. Our Welds are perfectly smooth Write us for prices.

COR. LEONARD AND WINTER STS

CLEVELAND, O.

M. W. FOGG Mattresses

and Cushions



202 Front St.

NEW YORK CITY.

#### THE ALLEN DENSE-AIR ICE MACHINE

Contains no chemicals, only air. Proven by many years' service in the tropics on United States men-of-war, steam yachts and passenger steamers. A hundred are in daily service on steamers.

H. B. ROELKER, 41 Maiden Lane, NEW YORK.

Consulting and Constructing Engineer.

Designer and Manufacturer of Screw Propellers.



#### Established 1844 A. SCHRADER'S SON, Inc.

32 Rose Street, NEW YORK Manufacturer of

Submarine Armor and Diving Apparatus We carry a complete stock of Dresses, Hose and Repair Sundries.

Improved Bolt Helmet All orders filled day received Write for our prices

# Watson-Stillman **HYDRAULICS**

Think of the work you expect a hydraulic jack to do, if it's going to be any good to you - to lift and carry for an indefinite period, a load that nothing but a good hydraulic jack can stand under. Then ask yourself if such loads should be imposed upon anything but the very best of workmanship and materials.

We took this into consideration in rejecting

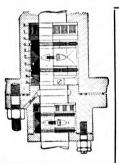


so-called seamless tubing for Watson-Stillman Jacks and make rams and cylinders from solid steel forgings. The Jack we built can be trusted, and we furnish them in 300 varieties suited for every purpose.

Send for our Jack List, Edition N.

#### WATSON=STILLMAN CO.,

Offices: 26 Cortlandt Street, NEW YORK 453 The Rookery, Chicago



https://hdl.handle.net/2027/nyp.33433109947659 http://www.hathitrust.org/access\_use#pd-google

2024-08-27 23:42 GMT 7, Google-digitized

0.0

#### Katzenstein's Self-Acting Metal Packing

For PISTON RODS, VALVE STEMS, etc. of every description for Steam Engines, Pumps, etc., etc. Adopted and in use by the principal Iron Works and Steamship Companies in this and foreign countries.

FLEXIBLE TUBULAR METALLIC PACKING, for slip-joints on Steam Pipes, and for Hydraulic Pressure.

For full particulars and reference, ad-

#### L. KATZENSTEIN & CO.

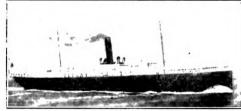
General Machinists.

358 West Street.

New York.



#### ROACH'S SHIP YARD.



in all its Branches

Ship Building

BUILDERS OF STEAMSHIP AND MARINE MACHINERY. Delaware River Iron Ship Building & Engine Works CHESTER, PA.



Pump Repaired with Smooth-On Iron Cement No. 1 six years ago, and still in use.

> Write for circular showing how work was done.

# **SMOOTH-ON** IRON CEMENT No. 1

is prepared in powdered form—for use mix with water. It is unequalled for stopping leaks of Steam, Water, Fire or Oil, because it becomes metallic iron that has the same expansion and contraction as iron, thus keeping tight at all temperatures.

Sold in Blue Labeled Cans.

Smooth-On Mfg. Co.

Jersey City, N. J., U. S. A.

#### Neversink Cork Jackets and Life Belt

Warranted 24 pounds. Buoyancy and full weight of Cork, as required by U. S. Inspectors.

Safest Consolidated Cork Life Preservers. Cheapest Ring Buoys and Fenders. Ring Buoys and Fenders.

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.



Metallic and Wooden Life Boats.

Metallic Life Rafts. Marine Drags.

Manufacturers of Woolsey's Patent Life Buoy—the lightest, cheapest and most compact life raft known.

DAVID KAHNWEILER'S SONS. Fox Building, Cor. Franklin Sq. and Dover Street, NEW YORK CITY.



■ Wilford's Waterproof Cloth is made of pure twisted flax thread. It is stronger and more durable than cotton, and on account of its light weight is most desirable for Hatch, Boat or Sail covers, Tarpaulins, Side Cloth or Roofing. It will not crack and is positively impenetrable by salt or fresh water. Our customers know this-from others we solicit a trial order.

#### **EDWARD A. BUNKER**

Sole Agent for the United States and Canada

P. O. BOX 1579, NEW YORK





# Jenkins Bros. Pump Valves

are made from various compounds, each of which is best



adapted for a particular kind of work. Our many years of experience has enabled us to so perfect these compounds that we can confidently recommend our Pump Valves as the very best obtain-

When ordering, give all particulars of service, and we will supply pump valves which we will guarantee. JENKINS BROS., New York, Boston, Philadelphia, Chicago, London,

# General Electric Company

Compact and Substantial. switchboards for all classes of marine service. Constructed of non-combustible materials

**Principal Office:** SCHENECTADY, N. Y.

Sales Offices in all large cities.

We handle and keep in stock

#### ROPE

of all sizes and lengths suitable for every purpose.

We make a specialty of cutting, splicing and fitting it for every possible requirement.



#### LIFE PRESERVERS—BUOYS

ACME. SOLID CORK. Each Preserver stamped by U. S. Inspector guaranteeing proper buoyanoy. Cork Filled Yacht Fenders. Cork Mooring Buoys. Material and Finish Guaranteed.

Orders filled promptly.

ARMSTRONG CORK COMPANY

Philadelphia

New York St. Louis

Pittsburg

# HOWARD H. BAKER & CO. SHIP CHANDLERS and SAIL MAKERS

18 to 26 Terrace,

Boston

Chicago

BUFFALO, N. Y.

